ABSTRACT SECTION

0. GENERAL FORESTRY

01. TERMINOLOGY. NOMENCLATURE. BIBLIOGRAPHY. MATHEMATICAL AND STATISTICAL ANALYSIS

See also *For. Abstr.* 11 (Nos. 2583, 2673, 2709, 2711, 2716, 2720–3, 2886, 2938, 3277, 3377–8).

2430. ELISEU, H. Terminologia florestal portuguesa—subsídios para a sua unificação. **[Portuguese forest terminology—contribution to its rationalization.]** *Publ. Serv. flor. aquic, Portugal* 10 (1), 1943 (97–112). [Port.e.]

Reviews and explains the traditional definitions—'subarbusto' (undershrub), 'arbusto' (shrub) and 'arvore' (tree), presents a scale of height classes, and defines some other terms used in forestry.

2431. ROBERTSON, W. M. **Selected bibliography of Canadian forest literature, 1917–1946, Pts. 1–3.** *Misc. silv. Res. Note For. Serv. Can.* No. 6, 1949. pp. 265.

The more important references—some 2,750—listed by the main forest organizations in Canada, are arranged by author under subject sub-heads (in 2 parts) along with a separate author and subject index.

02. TEXTBOOKS. DICTIONARIES

2432. EGGELING, W. J. (Revised by SANGSTER, R. G.) **Elementary forestry. A first textbook for [African] forest rangers.** Baillière, Tindall & Cox, London. 1949. pp. 307. Cf. *For. Abstr.* 5 (p. 7).

2433. MRUGOWSKI, H. **English and German dictionary for the wood and timber trade, including the most customary home-grown and foreign wood names and their scientific denominations.** [Deutsches und englisches Fachwörterbuch für die Holzwirtschaft.] Verlag M. & H. Schaper, Hannover. 1948. pp. 201. [E.G.]

05. PERIODICALS

2434. **A list of periodicals and bulletins containing abstracts published in Great Britain.** Royal Society, Burlington House, London, W.1. 1949. pp. 62. I.F.B.

06. CONFERENCES

See *For. Abstr.* 11 (Nos. 2459, 2471–2).

07. EDUCATION AND RESEARCH. ARBORETA. EXPERIMENTAL FORESTS. TRAVEL.

See also *For. Abstr.* 11 (Nos. 2991–2, 3147).

2435. SOUZA, P. F. DE. Escolas de silvicultura. **[Schools of forestry.]** *Brasil madeireiro* 5 (52/53), 1949 (16–9). [Port.]

A brief description of the forestry teaching institutions of Europe and America, with an outline of a programme for a proposed School of Forestry in Brazil.

2436. LUTZ, H. Die land- und forstwirtschaftlichen Berufe unter besonderer Berücksichtigung der Ausbildungsverhältnisse in der sowjetischen Besatzungszone Deutschlands. **[Careers in agriculture and forestry, with special reference to the Soviet Occupation Zone of Germany.]** Das Neue Berlin Verlagsgesellschaft M.B.H., Berlin N4. (*Schriftenreihe Arbeit und Beruf*, Heft 3.) 1948. pp. 80. [G.]

Brief indications are given of the categories of employment and the work involved, followed by details of educational requirements for the various grades (from forest workers to forest officer), schools at which courses may be taken, and costs of courses.

2437. MCCULLOCH, W. F. **Forest management education in Oregon.** *Ore. St. Monogr.* (*Studies in Education*) No. 2, 1949. pp. 119 + forms. 48 refs.

Sketches the development of forestry education in U.S.A. and (in more detail) particularly in Oregon, and sets out a proposed system by which students would spend an appreciable time on paid jobs with industrial forestry concerns.

2438. EKLUND, B. Organización y labores del Instituto de Investigaciones Forestales de Suecia. [**Organization and work of the Swedish Forest Research Institute.**] *Montes, Madrid* 5 (30), 1949 (487–97). [Span.]

2439. **Malayan forest research programme 1950.** *Malay. Forester* 13 (1), 1950 (28–40).

2440. KEYSTON, J. E. **A report on regional organisation of research in the Rhodesias and Nyasaland.** Central African Council, Salisbury, Rhodesia. 1949. pp. 91. Price 5*s*.

2441. TAMESIS, F. **A review of Philippine forest and forest products research.** *Philipp. J. For.* 6 (1), 1949 (1–21 + 8 photos).

2442. BURGERS, T. F. El arboretum de forestal de Villarejo. [**The forest arboretum of Villarejo.**] *Montes, Madrid* 5 (29), 1949 (400–4). [Span.]

Notes on the development of trees raised in the arboretum since 1929.

2443. TRYON, H. H., and FINN, R. F. **The Black Rock Forest: Twenty-year progress report 1928–1948.** *Black Rock For. Bull.* No. 14, 1949. pp. 89. 27 refs.

2444. PAULIAN, R. Un naturaliste en Côte d'Ivoire. [**A naturalist in the Ivory Coast.**] Éditions Stock, Delamain et Boutelleau, 6 Rue Casimir-Delavigne, Paris. 1949. pp. 217. [F.]

A semi-popular travel book, covering much of the subject matter of the author's ecological studies already published. [Cf. *For. Abstr.* 10 (No. 1691).]

09.1. *Forest History*

See also *For. Abstr.* 11 (No. 3419).

2445. MIKLASZEWSKI, J. Rzut oka na dzieje i stan leśnictwa i łowiectwa polskiego w okresie 1918–1939. [**A short review of the history and state of Polish forestry and hunting from 1918–39.**] *Sylwan* 91 (1/4), 1947 (10–31). [Pol.]

2446. GROSSMAN, H. Die schweiz. Forstwirtschaft in der zweiten Hälfte des 19. Jahrhunderts. [**Swiss forestry in the second half of the 19th century.**] *Schweiz. Z. Forstw.* 100 (10/11), 1949 (464–86). [G.]

2447. GEORGOPULOS, A. Forstliches aus dem griechischen Altertum. [**Forestry in ancient Greece.**] *Schweiz. Z. Forstw.* 101 (1), 1950 (38–44). 23 refs. [G.f.]

2448. DIKER, M., and INAL, S. Ormanciligimizin ana davalarindan ağaçlandirma. [**Afforestation—one of our basic forestry problems.**] *Ankara Yüksek Ziraat Enstitüsü Dergisi* 5 (1) (Ser. No. 9), 1945 (1–126 + 1 map, 1 dgm.). Many refs. [Turk.]

A short review of the history of Turkish forests and forestry. There were no formal resolutions concerning the care of forests until the reforms of 1839, and after 1856 French experts were invited to Turkey as advisors. Government concessions to private interests, however, multiplied sawmills and accelerated forest destruction. In 1870 protective measures were formulated, but afforestation was practically confined to private enterprise and, after 1891, to the students of the newly amalgamated Higher Forestry and People's Agricultural School. In 1916 a Seed Institute was founded by the School of Practical Forestry Workers, from which various parts of the country were supplied. The first Eucalypts were also planted about this time, as ornamental trees.

Under the Republic, forestry was encouraged. In 1924 a nursery was set up at the Forestry School, where 50,000 seedlings were raised annually and sent, for the first 10 years, for afforestation work at Ankara, and thereafter to Istanbul and elsewhere. A similar nursery was established in Ankara in 1926. During this period the Ministry of Agriculture began to develop aerial sowing, and a large quantity of Robinia seed, obtained from France, was sown by this method. In 1937 a Forest Law was promulgated, providing for protective measures, compulsory planting and inducements to plant, prizes being awarded for voluntary planting.

The 1938 Report on Afforestation put out by the Agricultural Congress gave the area to be afforested as 182,500 ha., of which 25,000 ha. were to be Eucalypts, and set up nurseries for this purpose at Ankara, Izmir and 5 other centres. In the spring of 1944, nearly 400,000 plants were put out as a start, but in some areas *ca.* 40% of these failed.

The first plywood factory, started at Istanbul in 1932 (wood consumption 12,000 cu.m. p.a.)

was followed by two paper and board factories, 1936 and 1943 (using 24,000 tons of wood p.a.), also a cellulose and an artificial-silk factory. At present most of the pulp and cellulose requirements can be met from native forests, but not the country's expanding needs for these and other wood products, e.g. fruit-packing crates, matches.

A detailed account, with illustrations, is also given of afforestation work at Florya, near Istanbul, and species available from the Forestry Department for shelterbelts, roadsides etc., are listed.

09.2. *Pre-history. Pollen Analyses, etc.*

See also *For. Abstr.* 11 (No. 2744).

2449. BURCHELL, J. P. T., and ERDTMAN, G. **Indigenous *Tilia platyphyllos* in Britain.** *Nature, Lond.* 165 (4193), 1950 (411). 2 refs.

Finds of *Tilia* pollen in late Quaternary deposits in England have hitherto all been of *T. cordata*, but pollen grains of *T. platyphyllos* have now been recovered from peat at Addington, Kent, which seals an occupation site of Mesolithic age. Several hundred Lime pollen grains were investigated under high-power magnification and it was found that 5% came from *T. platyphyllos* and 75% from *T. cordata* and the hybrid between the two species. The remaining 20% could not be determined, on account of partial sporoderm destruction.

09.4. *Forest Statistics*

See also *For. Abstr.* 11 (Nos. 2903, 2988, 3201–7).

2450. **Yearbook of forest products statistics 1949.** Food and Agriculture Organization of the United Nations, Washington, D.C. 1949. pp. 195. [E.F.Span.]

2451. OSARA, N. A., PÖNTYNEN, V., and ERKKILÄ, E. E. Suomen puun käyttö ja metsätase. [**Wood utilization and forest balance in Finland.**] *Commun. Inst. for. Fenn.* 36 (4), 1948 (1949). pp. 166. [Fi.e.]

This investigation, referring mainly to conditions in 1938, was carried out in connexion with the 2nd National Forest Survey. Details of consumption by species and categories of timber are given in a series of tables with headings in English.

2452. TUTENBORG, F. Internationale Sammlung von Forststatistiken: Statistisches über die finnische Forst- und Holzwirtschaft. [**International report on forest statistics: Statistics of Finland's forestry and timber trade.**] *Z. Weltforstwirt.* 13 (1/3), 1949 (48–51). [G.]

2453. ARMAN, V. Några preliminära resultat från rikstaxeringen av Blekinge, Kristianstads, Malmöhus och Hallands län. [**Some preliminary results from the National Forest Survey for the counties of Blekinge, Kristianstad, Malmöhus and Halland.**] *Svenska SkogsvFören. Tidskr.* 46 (6), 1948 (393–426). [Sw.] (Also as *Medd. Skogsforskn-Inst. Stockh., Ser. Uppsatser* No. 12.)

Gives statistics from the 1945 survey and compares them in tabular form with those from the first National Forest Survey of 1928.

2454. Verslag over de landbouw in Nederland over 1942 t/m 1945. [**Report on agriculture in the Netherlands, 1942–45.**] *Verslagen en Mededelingen van het Ministerie van Landbouw, Visserij en Voedselvoorziening, 's-Gravenhage* 1949, No. 1. pp. 244. [Du.] [Forestry on pp. 155–67.]

2455. SENCHUROV, K. T. Lesnŷe resursŷ i lesnaya promŷshlennost' Albanii. [**The forest resources and forest industry of Albania.**] *Lesn. Prom.* 1949 (12), (22). [Russ.]

2456. **Operations in the woods. Final estimates of [Canadian] forest production 1947.** Dominion Bureau of Statistics, Ottawa. 1950. pp. 18. [E.F.]

2457. DRUCE, E. [**Forest resources of British Columbia.**] *Transactions of the 2nd Resources Conference [of British Columbia]* 1949 (131–51). 9 refs.

2458. DUERR, W. A. **The southern hardwood problem: some resource facts.** *Sth. Lumberm.* 179 (2249), 1949 (147–52).

According to figures from the U.S. Forest Survey of 1932–36 and a reappraisal made in 1945, small hardwoods in the South are on the increase, while large hardwoods and both large and small Pines are decreasing. The second Forest Survey of Mississippi in 1946–48 revealed that, whereas at the time of the first survey Pine was predominant, Pine types now occupy only 45% of the 16½ million acres of

forest land. Reasons for these changes are discussed.

2459. I reunião da Comissão Latino-Americana de Florestas e Produtos Florestais. Relatório final sôbre a utilização dos recursos florestais do continente e necessidades em material de equipamento. **[First meeting of the Latin-American Commission for Forests and Forest Products. Final report on the utilization of the forest resources of the continent and requirements in material and equipment.]** *Brasil madeireiro* 5 (55), 1949 (19–35). [Port.]

Includes statistics concerning the forest resources of Latin America, the productive forests, the growing stock, annual growth, fellings and total production, and exports and imports in 1946 and 1947.

09.7. *Monographs of Individual Forest Regions*

See also *For. Abstr.* 11 (Nos. 2636, 2721, 3419, 3434).

2460. Buchholz, E. Die forstpolitischen Verhältnisse Polens nach dem Kriege. **[Post-war forest conditions and policy in Poland.]** *Z. Weltforstwirt.* 13 (1/3), 1949 (11–20). 19 refs. [G.e.f.] [Zentralinstitut für Forst- und Holzwirtschaft, Reinbek bei Hamburg.]

2461. Lihtonen, V. *et al.* **Finnish forestry in pictures.** Sininen Kivja Osakeyhtio, Helsinki. 1949. pp. 30 + 350 photos. [Fi.E.]

2462. Kriesche. Die Holzwirtschaft Persiens. **[The timber industry in Persia.]** *Schweiz. Z. Forstw.* 101 (2), 1950 (112–6). [G.f.]

A brief account of the forests of Persia, the timber industry, and future policy. Conversion is carried out usually by hand-sawing. Much charcoal is burnt, and the mines require large quantities of timber. Beech and Poplar are the most important species.

2463. Saï, K. L'Iran forestier. **[The forests and forest industries of Persia.]** *Rev. Bois Appl.* 4 (11; 12), 1949 (3–8; 11–3). [F.]

Describes briefly the distribution and composition of forests in Persia. Discusses the use of wood for fuel and construction and in the manufacture of matches, furniture, plywood and mining timbers, the production of tanning materials, and forest grazing; with tables showing exports of wood and wood products. Outlines the history, policy and administration of forestry in Persia, and discusses the problems of protection against charcoal burning, grazing, fires, insects and fungi and uncontrolled felling.

2464. Keet, J. D. M. **Forests of the Okavango native territory.** *J. S. Afr. For. Ass.* No. 19, 1950 (77–88). 12 refs.

The Ovamboland, Okavango and Caprivi Zipfel Native Territories in South-West Africa have extensive forest and woodland corresponding to the *Baikiaea—Copaifera—Pterocarpus—Ricinodendron* forest and woodland types on Kalahari sand soils; identical associations appear in the comparable climatic regions of Angola, Barotseland, Southern Rhodesia and the Bechuanaland Protectorate, of which the Okavango forests appear to be later extensions. The forests and woodlands in the Okavango are comparatively young and vigorous. They are still extending southwards and westwards. Regrowth of the principal timber species is satisfactory. The 'forests' in these territories constitute a timber resource of great potential value, but recurrent fires consume large quantities of timber and have reduced extensive areas to useless scrub. Distance to rail and absence of roads render exploitation impracticable for the present. Meanwhile protection from fire remains an urgent although difficult problem. The composition and nature of the forests are described and a list of trees and shrubs of the Okavango region is given. Publications relating to the vegetation of the regions referred to are given. *From author's summary.*

2465. Ruschi, A. O problema florestal no estado do Espirito Santo. **[The forest problem in the state of Espirito Santo.]** *Brasil madeireiro* 5 (49), 1949 (11–27). [Port.]

A discussion of problems connected with the forests of this region, with some results of a forest inventory.

2466. Gomes, P. Exploração racional da floresta amazônica. **[Rational exploitation of the Amazonian forests.]** *Brasil madeireiro* 5 (52/53), 1949 (8–15). [Port.]

Some data on the forests and suggestions for their exploitation and utilization.

2467. BÉNA, P. L'exploitation forestière doit servir de tremplin à l'essor économique du département français de la Guyane. **[Forest exploitation ought to be the spring-board for the economic progress of French Guiana.]** *Bois For. Trop.* No. 11, 1949 (251–68). [F.]

An account of the forests of French Guiana, the methods of exploitation, transport, and conversion actually in use, and a discussion of possible future developments.

2468. LOPEZ, E. D., CALDEVILLA, G. M., and LAFFITTE, J. C. Informe sobre la situación del Uruguay en materia forestal. **[The position of Uruguay with regard to forest resources.]** *Revista de la Asociación de Ingenieros Agrónomos, Montevideo* 21 (84), 1949 (5–11). [Span.]

Brief notes on the distribution and extent of the forests in Uruguay, the forest administration and laws, exploitation, forest products industries, domestic consumption of timber, and imports and exports.

2469. SARLIN, P. Les forêts de la Nouvelle-Calédonie. **[The forests of New Caledonia.]** *Bois For. Trop.* No. 12, 1949 (393–406). [F.e.]

1. FUNDAMENTAL NATURAL LAWS OF THE FOREST

11.1. *Atmosphere. Meteorology*

11.16. Electricity. Radiations other than Light

2470. FEHÉR, D. Untersuchungen über die biologische Wirkung der kurzwelligen Strahlung der Elemente. VIII. Die Ermittlung der Strahlenempfindlichkeit verschiedener Pflanzen im Dunkeln und im Lichte. **[Investigations on the biological effect of the short-wave radiation of chemical elements. VIII.]** *Erdész. Kisérl.* 47, 1947 (222–9 + 5 photos). [G.g.e.]

[For earlier studies see *For. Abstr.* 8 (No. 878).] The results of the present investigation showed that different species varied in sensitivity to radiation, and that sensitivity is the same in light and in darkness.

11.4. *Soil*

2471. **Proceedings of the first Commonwealth Conference on tropical and subtropical soils, 1948.** *Tech. Commun. Bur. Soil Sci., Harpenden* No. 46, 1949. pp. 235. Price 25*s*.

The Conference at which these papers were presented was held at Harpenden in June, 1948. The papers are grouped under the 4 subjects that were discussed, one at each of the sessions of the Conference (a review of tropical and subtropical soils, soil classification, fertility problems, and soil erosion), and each group of papers is followed by a summary of the subsequent discussion.

2472. Comptes rendus de la Conférence africaine des sols, Goma (Kivu), Congo Belge, 8-16 Novembre 1948. III. **[Proceedings of the African Soil Conference held at Goma (Kivu), Belgian Congo, 8–16 Nov. 1948.]** *Bull. agric. Congo belge* 40 (3/4), 1949 (1981–2558). [F.]

Cf. *For. Abstr.* 11 (No. 1594). This (the third and last) fascicle deals mainly with (*a*) mechanization of agriculture and use of fertilizers, and (*b*) economic and social aspects of soil conservation; it carries an author index and table of contents for all 3 fascicles.

2473. GAISER, R. N. **A simple soil sampler and its use as a permeameter.** *Tech. Pap. Cent. St. For. Exp. Sta.* No. 112, 1949. pp. 3.

11.42. Soil Chemistry

See also *For. Abstr.* 11 (Nos. 2485–6, 2561).

2474. BENNETT, E. **Fixation of ammonia by lignin.** *Soil Sci.* 68 (5), 1949 (399–400). [Massachusetts Agricultural Experiment Station.]

2475. SOWDEN, F. J., and ATKINSON, H. J. **Composition of certain soil organic matter fractions.** *Soil Sci.* 68 (6), 1949 (433–40). 23 refs.

A study of the nature of the organic material isolated during separation and fractionation of soil colloids.

2476. ALLISON, F. E., SHERMAN, M. S., and PINCK, L. A. **Maintenance of soil**

organic matter: I. Inorganic soil colloid as a factor in retention of carbon during formation of humus. *Soil Sci.* 68 (6), 1949 (463–78). 25 refs.

The results emphasize the fact that the nature of the soil and the composition of the added organic materials are the determining factors in the quantity of humus formed and held by a soil; the C/N ratio, as such, has often been over-emphasized in previous studies. *From authors' summary.*

11.43. Biology of Soil, including Mycorrhiza

See also *For. Abstr.* 11 (Nos. 2492, 2513).

2477. **Mycorrhiza.** *Nature, Lond.* 164 (4181), 1949 (1041–2).

Summarizes the papers read at a meeting of the British Mycological Society on 21st Oct. 1949, to discuss the subject of mycorrhizae in plants. The programme included two general papers, 2 papers on endotrophic infection and 4 papers on the ectotrophic infection of trees. Dr. W. R. C. Handley analysed the possible factors concerned in the process of infection of tree roots by mycorrhizal fungi; Mr. J. Warren Wilson described an attempt at correlating certain morphological and physiological changes in Beech seedlings with the onset of development of mycorrhizal roots; Dr. F. A. L. Clowes showed that the basic pattern of cell and tissue arrangement in Beech roots is the same in mycorrhizal and non-mycorrhizal roots; Dr. Ida Levisohn described several examples of pseudomycorrhizae found on Pine and Spruce roots.

2478. JOHNSTON, A. **Vesicular-arbuscular mycorrhiza in Sea Island Cotton and other tropical plants.** *Trop. Agriculture, Trin.* 26 (7/12), 1949 (118–21 + 4 dgms.). 12 refs.

Vesicular-arbuscular mycorrhizae occurred in 86% of species examined in a representative sample of the Trinidad flora. Although common in each of the ecological habitats surveyed, the proportion of mycorrhizal species and the intensity of infection varied; both were greatest in forest soils of comparatively high organic content. The following tree species were found to be infected in varying degrees:—*Alchornea glandulosa, Protium guianense, Tectona grandis, Terminalia dichotoma, Andira inermis, Didymopanax morototoni, Pentaclethra macroloba, Sterculia caribaea, Mora excelsa, Calophyllum antillanum, Byrsonima spicata, Carapa guianensis* and *Eschweilera subglandulosa.*

Two types of endophyte were recognized, differing in the mode of degeneration of the fungus in root cells. These are termed the 'sporangiolar' and 'intracellular hyphal' types respectively. The latter was commoner in all groups of plant examined, except weeds.

2479. NORKRANS, B. **Some mycorrhiza-forming *Tricholoma* species.** *Svensk bot. Tidskr.* 43 (2/3), 1949 (485–90). 10 refs. [E.] O.B.D.

Synthesis experiments proved the ability of the following species to form ectotrophic and ectendotrophic mycorrhizae:—(1) *Tricholoma saponaceum* (with Pine and Birch), (2) *T. equestre* (with Pine and Birch), (3) *T. sejunctum* (with Birch), (4) *T. flavobrunneum* (with Pine). *T. brevipes* and *T. gambosum* formed no mycorrhizae with either tree species.

2480. MIKOLA, P. **On the physiology and ecology of *Cenococcum graniforme* especially as a mycorrhizal fungus of Birch.** *Commun. Inst. for. Fenn.* No. 36 (3), 1948 (1949). pp. 104. 95 refs. [E.e.fi.]

The physiology of the fungus was investigated in pure-culture experiments. The following are the main results:—*Cenococcum* is favored by an acid medium; optimum pH is *ca.* 4·0, and the limits within which the fungus thrives are 2·4–7·0, which are those of the greater part of N. European forest soils. Optimum temperature is about + 25° C., and the maximum temperature proved low in these experiments. *Cenococcum* is intermediate between mycorrhizal fungi proper and forest-soil saprophytes in the matter of carbon nutrition, being capable of utilizing starch but not cellulose, in addition to simple sugars. It is able to utilize many N compounds for its nitrogen source. Organic N is not indispensable, but readily available amino acids appear to benefit the growth of the fungus. Thiamin is the only growth substance which very strongly stimulates the growth of *Cenococcum*, but it is not absolutely necessary, at least not for all strains. The relation of *Cenococcum* to substances stimulating and retarding the growth of fungi present in leaf litter, is similar to that of other mycorrhizal fungi, but it is

slightly less sensitive to certain antibiotic influences. It does not, to any appreciable extent, produce substances inhibiting or stimulating the growth of other fungi. As a former of mycorrhizae, *Cenococcum* is less dependent than most mycorrhizal fungi on the light received by the host plant.

These pure-culture experiments confirm the conclusions that can be made regarding the ecology of *Cenococcum* on the basis of its occurrence in nature. It is an organism characteristic of acid raw humus deficient in nutrients, and is present as a mycorrhiza former in heavily shaded forest where the conditions for the formation of mycorrhizae by other fungi are poor or lacking. It is a facultative mycorrhiza fungus which can live in the soil as a saprophyte also. *From author's summary.*

2481. UBRIZSY, G. Az erdötalajok makroszkópikus gombavegetációja és az R.-tényezö. **[The growth of macroscopic fungi of forest soils and the R-factor.]** *Erdesz. Kisérl.* 48 (3/4), 1948 (94–107). 16 refs. [Hu.f.]

The climax season for fungi is shown to be related to the R factor [soil moisture value expressed as a percentage × soil temperature value] of the soil. For Oak woods, the climax is reached twice during the year, in summer and autumn, and for Fir woods once only, in autumn. Optimum conditions for fungus growth in an Oak wood were found in summer with a soil humidity of 20–30%, and in a Fir wood in autumn with a soil humidity of 30–40%. Examples are quoted from different forest types, the fungi most frequently found are listed, and relationships between the presence of fungi and the R factor are shown in graphs. *From author's summary.*

2482. FEHÉR, D., and FRANK, M. **Researches on the geographical distribution of soil microflora. I. The geographical distribution of soil bacteria.** *Communication of the Botanical Institute of the Hungarian University of Technical and Economic Sciences, Sopron* No. 15, 1947. pp. 39. 51 refs. H.S.B.

Presents the results of preliminary investigations of soil samples from different parts of the world, in the form of tables: (1) describing the soil samples and their localities, and (2) showing the geographical distribution of the bacteria isolated and cultivated. Some general conclusions are drawn, but no associations of bacterial flora characteristic of any particular geographical area or soil were found.

2483. SEIFERT, J. Celulosové bakterie v půdách lesních porostů. **[Cellulose-destroying bacteria from forest soils.]** *Sborn. čsl. Akad. zeměd.* 20 (2/3), 1948 (213–21). Numerous refs. [Cz.e.russ.] C.G.B.

An attempt was made to find a correlation between the distribution of cellulose-destroying soil bacteria and vegetation. Cellulose-destroying bacteria seem to form their own communities, which are dependent on the soil's physical and chemical properties, and on the vegetation. In deciduous forests they are represented chiefly by the genus *Cellfalcicula.* Coniferous woods are characterized by *Cytophaga* spp. especially *C. hutchinsoni* and *C. silvestris,* and by moulds. Tables show the occurrence of different species of cellulose-destroying bacteria in several soil samples from Bohemia.

A key is presented, containing all the cellulose-destroying bacteria known to the author, with descriptions of 4 new species of *Cellfalcicula. From author's summary.*

2484. FRANZ, H., and LEITENBERGER, L. Biologisch-chemische Untersuchungen über Humusbildung durch Bodentiere. **[Biological and chemical investigations of the formation of humus through the agency of soil fauna.]** *Österreichische Zoologische Zeitschrift, Vienna* 1 (5), 1948 (498–518). Numerous refs. [G.g.] [Bundesanstalt für alpine Landwirtschaft, Admont, Steiermark.]

In a laboratory study of the role of soil fauna in humus formation several individual species were tested with fresh, undecomposed fallen leaves, hay or straw. Only one plant species at a time was represented in each type of food. Excrement and unconsumed material were afterwards examined for their content of humus and humus precursors. The soil fauna consumed all types of material tested, and produced excrement of a humous nature in which decomposition had proceeded considerably farther than in the original foodstuffs. As compared with the latter, the excrements were richer in matter insoluble in AcBr, representing not only the AcBr insolubles of the original foods, but also material converted into this form by digestive processes. Animals (e.g. insects) feeding on living

plant materials also contribute to humus formation in a similar way. The nature of the humus material formed depended primarily on the type of food consumed, and only secondarily on the species of animal concerned.

11.44. Litter. Surface Humus

See also *For. Abstr.* 11 (Nos. 2474–6, 2483–4, 2492, 2561).

2485. JENNY, H., GESSEL, S. P., and BINGHAM, F. T. **Comparative study of decomposition rates of organic matter in temperate and tropical regions.** *Soil Sci.* 68 (6), 1949 (419–32). 13 refs.

Presents a comparison of N and organic-matter content of Californian and Costa-Rican soils, of litter collections made in virgin forests of Colombia and California, and of speed of decomposition of alfalfa in Costa Rica, Colombia and California. High N and organic-matter contents were found in many Colombian and Costa-Rican soils. The annual production of organic matter in the form of leaves and twigs is much greater in tropical forests (7,600–10,700 lb./acre) than in the forests of the Sierra Nevada (820–2,800 lb./acre). Alfalfa leaves, however, decompose rapidly in tropical soils and slowly in temperate ones, and the results of these studies were confirmed by calculations of decomposition rates of forest floors in Colombia and California. The time required to reach near-equilibrium accumulation of forest floors is calculated to be less than a decade in tropical forests, 30–60 years under California Oak and 100–200 years under Ponderosa Pine.

11.47. Maintenance of Favourable Soil Conditions. Soil Fertility

See also *For. Abstr.* 11 (Nos. 2561, 2566, 2652, 2691, 3246, 3412–5).

2486. HARMSEN, G. W., and LINDENBERGH, D. J. **Investigations on the nitrogen nutrition of plants. 1. A new method for the determination of nitrogen-requirement of soils.** *Plant & Soil* 2 (1), 1949 (1–29). 7 refs. [E.e.]

2487. CAMPBELL, D. A. **Preliminary aerial distribution trials with superphosphate and seed mixtures.** *Repr.* from *N.Z. J. Sci. Technol.* 30 (2), 1948 (65–77). 3 refs.

Experimental flights showed that fertilizer could be dropped from aircraft successfully, within the desired limits of accuracy, provided that the ballistics of the fertilizer are reasonably uniform. From preliminary measurements of the distribution of grass and clover seed from beneath the fuselage of a single-engined plane, the indications are that satisfactory distribution and control of the individual components of the mixture are not obtained, owing to the varying ballistics of the seed. The necessary control would appear to involve pelleting or cementing seed into larger aggregates for aerial distribution. [Cf. *For. Abstr.* 11 (p. 141).]

2488. MCCOMB, A. L. **Some fertilizer experiments with deciduous forest tree seedlings on several Iowa soils.** *Res. Bull. Ia. agric. Exp. Sta.* No. 369, 1949 (405–48). 53 refs.

The growth of Green Ash (*Fraxinus pennsylvanica* var. *lanceolata*), American Elm (*Ulmus americana*), Red Oak (*Quercus borealis*) and Black Locust (*Robinia pseudoacacia*) was studied on 4 soils (a grey-brown podzolic forest, and 3 prairie, soils) in relation to N, P, and K fertilization. Black Locust did not respond to applications of N. Response of the other 3 species diminished as the residual soil nitrogen supply increased. The evidence suggested that about 2,000 lb. total N/acre is a level above which seedling responses to N fertilizers could not be expected. P was found to be deficient only in the forest soil; seedling response to P fertilizers was less than that to N. K was not deficient on any of the soils. Several species differences were evident. Black Locust responded only to P. Red Oak showed marked root responses to P, was the only species with ectotrophic mycorrhizae, and was least tolerant of high soil pH. Green Ash was most tolerant of alkaline soil. A comparison of greenhouse and outdoor experiments, using the same species and soil, indicated that data derived from greenhouse experiments will not necessarily be valid for the degree of response to fertilizers applied out of doors. Red Oak and Green Ash grew better on the forest than on the prairie soils. It is concluded that under average eroded-field conditions in Iowa, the response of hardwood planting stock to

fertilizer will probably be little or none. P fertilizer for Black Locust is indicated if quick and complete coverage of raw subsoil gullies is desired.

2489. CAUGHEY, M. G. **Effects of fertilizer on growth rates of *Ilex lucida*.** *Abstr.* in *J. Elisha Mitchell sci. Soc.* 63, 1947 (99–100). L.S.

Presents results of experiments to find the effects of nitrate and Ca fertilizers on *I. lucida* growing in peat soil in N. Carolina. $NaNO_3$ at a rate of 400 lb. per acre produced the best growth. Shrubs treated with $CaSO_4$ were markedly stunted.

2490. ITHIER, H. La fumure du peuplier est-elle rentable? [**Does manuring of Poplars pay?**] *La Potasse, Mulhouse* 21 (149), 1947 (186–8). 3 refs. [F.] H.S.B.

The effects of fertilizer were observed on:—(1) Poplar cuttings in the nursery and (2) young Poplars planted out in their final positions. For the cuttings the ground was treated in spring with a mixture of fertilizer containing 16–18% Thomas slag (600 kg./ha.) and 49% KCl (300 kg./ha.). A few days before the cuttings were set, 150 kg. per ha. of $CaCN_2$ was harrowed in. Surface dressings (100–125 kg. [per ha.?] of $CaCN_2$) were also hoed in directly after the beginning of the vegetative period in the 2nd and 3rd years. The treatments increased considerably the number of plants averaging 16–18 cm. and 12–14 cm. in height in comparison with unfertilized plots, though losses were also higher. For (2) a mixture was required containing sodium or calcium nitrate (0·5 kg. per ft.[?]), 14–16% superphosphate (1 kg. per ft.) and 49% KCl (0·5 kg. per ft.), but difficulty of applying such a mixture made advisable the use of a commercial preparation with a formula as near to this as possible. The young plants were earthed up and the fertilizer applied to the individual trees in the 2nd and 3rd (and in individual cases the 4th) years. A marked advance in girth and height compared with untreated trees was observed. Both types of treatment seem to be economically justified.

2491. GUILLOT, L. Le pin sylvestre dans l'évolution des peuplements forestiers. [***Pinus sylvestris* in the evolution of forest stands.**] *Rev. for. franç.* 1950 (2), (90–4). [F.]

The author gives reasons for regarding the Scots Pine as being usually a species producing degradation of the soil, and recommends that it should either be used to fill gaps in broad-leaved stands, or be planted on heathland and felled at 30 or 40 years, by which time it will have shaded out the *Calluna*, and more valuable species can be planted in its place. [Cf. *For. Abstr.* 11 (No. 2561).]

2492. **[Soil survey of the Culbin Forest.]** *Rep. Macaulay Inst. Soil Res. 1948–9*, [1950] (22–3).

An intensive survey of the Culbin Forest [cf. *For. Abstr.* 11 (No. 1791)] has been completed. The flattened summit of an immobile dune with unplanted areas and plantations of *Pinus nigra* 10 and 20 years old was selected for detailed investigation. Soil profiles were sampled to a depth of 4 ft. Generally it may be said that afforestation of the sand dunes leads to an increase in the fine sand fraction. In the planted areas there is a cyclic movement of available nutrients with a depletion of nutrients in the lower sand layers and an increase in the upper layers. Soil acidity increases with afforestation. With the closing of canopy in the oldest plantation a continuous litter cover has formed. The moisture content of the upper sand layers decreases markedly with afforestation. It has been shown that the moisture present in the dunes is derived from rain-water which percolates slowly downwards; no evidence was obtained to suggest that water is supplied from the low-lying water-table.

Increased microbiological activity following the formation of continuous litter and humus layers in the older plantations has been demonstrated. Basidiomycetes form a large proportion of the fungal mycelium observed in the field.

11.49. Soil Types

See also *For. Abstr.* 11 (Nos. 2561, 2566).

2493. AALTONEN, V. T. Studien über die Bodenbildung in den Hainwäldern Finnlands mit einigen Beobachtungen über ausländische Braunerden. [**Studies on soil formation in Finnish woods of Cajander's 'grove' type, with some observations on brown earths in some other countries.**] *Commun. Inst. for. Fenn.* No. 35 (1), 1947 (1949). pp. 92. 26 refs. [G.fi.]

A study based on data obtained in 1933–9, and written some years before publication.

2494. GRIFFITH, A. L., and GUPTA, R. S. **Soils in relation to Teak with special reference to laterisation.** *Indian For. Bull.* No. 141, 1948. pp. 58 + 4 photos, 4 gphs. 51 refs.

A general review of the previous literature on the subject is given, which appears to suggest that in Teak plantations there occurs a deterioration of the soil, hand in hand with the lowering of the site quality. It has been suggested that laterization of the soil may be one of the factors responsible for this deterioration. The present investigation was undertaken to test the truth of this theory, and find some simple index by which to recognize Teak soils. A majority of the observations made by the authors support the contention held by most soil scientists, that the process of laterization is of geological duration, and that it is a primary process of weathering down of the parent geological rock to a laterite type. According to this view, the probable change taking place in the soil mass, after clear-felling and planting, might be a hardening of the laterite or the lateritic soil, in case the latter pre-existed in the locality, and not its formation as suggested by some workers.

The findings on soil requirements of Teak are given in detail [cf. *For. Abstr.* 9 (No. 77)] and a possible method of forecasting the quality of Teak to be expected on a given site is outlined [cf. *For. Abstr.* 10 (No. 1584)], based on the SiO_2/R_2O_3 ratio, the dispersion coefficient, depth of permanent availability of moisture, and aspect.

11.6. *Hydrographical Conditions. Water and Soil Conservation*

See also *For. Abstr.* 11 (Nos. 2471–2, 2488, 2492, 2684, 2698–2702, 3456–8).

2495. HUGHES, J. F. **Forests and water supplies in East Africa.** *Emp. For. Rev.* 28 (4), 1949 (314–23). 23 refs.

This paper deals with the problem of water conservation when forest is replaced by grassland. It is written with particular reference to East Africa, where widespread clearing in connexion with anti-tsetse work has been suggested. The operation of the hydrological cycle is discussed, and by examples from East Africa and elsewhere the possible effects of replacement of forest by grassland are shown. The complexity of soil/vegetation/water relations is stressed, as is also the danger of generalizing from the results of one or two experiments. Decisions on the effect of clearing upon water supplies can only be made after assessment of a number of local factors. This requires research and planning, and without such preliminary work, widespread clearing may adversely affect water supplies. *Author's summary.*

2496. CROFT, A. R. **A water cost of run-off control.** *J. Soil Wat. Conserv.* 5 (1), 1950 (13–5).

Studies of run-off have been made for a number of years on some tree-covered sites in Utah. These are occupied by a stand of Aspen whose light, leafy crowns permit a dense understorey of herbaceous plants. The vegetation on these sites has prevented run-off and all soil loss during the 15 years recorded. In 1947 (1) all Aspens were removed from some plots, leaving only the grasses and herbaceous plants, and (2) all vegetation was removed from other plots. During the ensuing 3 years almost as effective control was afforded by the vegetation on plots (1) as by the original stand (but it is noted that no very intense rains were experienced during this period). Removal of all vegetation resulted in run-off of *ca.* 10% of the summer rainfall and erosion at the rate of 10 tons/acre.

Water consumption for these 3 conditions was determined by studying moisture content in blocks of soil 80 ft. long, 30 ft. wide and 6 ft. deep. The moisture content of these blocks at field capacity, minus the moisture content at the end of the growing season, was used as a measure of the evapo-transpiration deficit created by the respective cover conditions; this deficit averaged 11–12 in. on sites with Aspen and herbaceous cover, 8 in. for herbaceous plants alone, and 3 in. on bare ground, yearly. The 8-in. deficit due to herbaceous vegetation appears to be the minimum water cost of keeping sufficient vegetation on the ground for summer-flood control, and the 3–4 in. saved by removing Aspen would probably provide additional stream flow. The possibility of increasing stream flow (*a*) by removal of Aspen, and (*b*) by the removal of any deep-rooted plants, needs further study.

2497. HAMILTON, E. L., and ROWE, P. B. **Rainfall interception by chaparral in California.** California Department of Natural Resources, Division of Forestry. 1949. pp. 43. 74 refs.

Loss of rainfall as a result of interception by shrub vegetation was measured at three points in central and southern California. Gross rainfall, throughfall (the quantity of rain actually falling to the ground), and stemflow (the rain reaching the ground as flow down the shrub stems) were measured, and interception loss was computed from the measurements. Interception loss varied from 4 to 14% according to the type of brush, season of the year, and duration and intensity of storm. In general, the annual loss of rainfall through interception ranged from 1·7 to 3·9 in. depending on the total annual rainfall and the character of the storms producing it.

Stemflow was greatly influenced by the branching habit and character of the bark of the various shrub species: shrubs of the woodland chaparral at North Fork, many of which have smooth bark and upright stems, yielded an average of 11 in. of stemflow out of an average annual rainfall of 38 in., whereas the Scrub Oak and *Ceanothus* spp. at San Dimas, with rough bark and spreading habit, averaged only slightly more than 2 in. of stemflow out of an average rainfall of 27 in. The % of annual rainfall represented by stemflow varied from 8 to 30%.

Throughfall, stemflow, and interception loss were generally directly proportional to storm size. For small storms the amount of interception loss can be as much as 50–75% and for large storms as little as 3–6% of the gross rainfall. Equations are given for estimating interception loss in storms of more than 0·30 in. for the 3 study areas. The interception process is explained by analysis of typical storms during which running records were made of rainfall, throughfall, stemflow and interception storage.

Results of the 3 studies show that stemflow is an important factor and cannot be ignored in considering the disposition of rainfall in brush types. The quantities of stemflow from chaparral species are not negligible amounts such as have been reported for coniferous tree species; the average annual stemflow for the 3 studies was 7½ in. or about 20% of the total rainfall. Only 5 to 11% of the total rainfall was lost by evaporation. *From authors' summary.*

2498. IRMAK, A. Toprak taşinmalari, sebebleri, memleketimizdeki önemi ve korunma çareleri. **[Soil erosion, its causes, importance and control in our country.]** *Ankara Yüksek Ziraat Enstitüsü Dergisi* 6 (2) (Ser. No. 12), 1946 (607–23). 7 refs. [Turk.]

Erosion conditions in Anatolia are described and compared for the major regions, and causes adduced. Not only propaganda and instruction are called for, but also legal sanction against erosive practices. Provision for protecting catchment areas already exists under article 79 of the Forest Law.

2499. GORRIE, R. M. **Necessity for the conservation of forests. The rôle of forestry in soil erosion control.** *Agriculture Pakistan, Karachi* 1 (1), 1949 (32–5). O.R.E.

Makes special reference to conditions in Pakistan.

2500. WALTON, A. B. **A forester's impressions of St. Helena.** *Malay. Forester* 12 (4), 1949 (198–201).

Mainly an account of anti-erosion measures.

2501. FRANZINI, F. L'enrichissement de la forêt du Gabon et ses répercussions sur la conservation des sols. **[The enrichment of the forest in Gabon and its repercussions on soil conservation.]** *Bull. agric. Congo belge* 40 (3/4), 1949 (2355–66). [F.]

Discusses the problems of raising food for increased populations on a reduced area, if the present policy of enriching the forest of Gabon with Okoumé is carried out on a large scale. [Cf. *For. Abstr.* 10 (No. 191).]

2502. HORTON, J. S. **Trees and shrubs for erosion control in Southern California Mountains.** California State Board of Forestry. 1949. pp. 72. 22 refs. [California Forest and Range Experiment Station.]

2503. BAILEY, R. W. **Forest and range management in flood and sediment control.** *Northw. Sci.* 23 (3), 1949 (99–111). [Intermountain Forest and Range Experiment Station, Ogden.] A.P.B.

The Columbia River flood of 1948, its nature and causes, are discussed and compared with those characteristic of the Wasatch, where watershed improvement has been in progress since 1933.

12. FOREST BOTANY. TREE SPECIES

12.1. *General Botany*

12.11. Physiology. Reproduction. Growth

12.11.1. *Metabolism. Plant Constituents. Photosynthesis. Translocation. Sap Flow. Transpiration. Growth Substances*

See also *For. Abstr.* 11 (Nos. 2527, 2813–5, 3148–56, 3160–5, 3168–70, 3179, 3181–3, 3186–95).

2504. CRAFTS, A. S., CURRIER, H. B., and STOCKING, C. R. **Water in the physiology of plants.** Chronica Botanica Co., Waltham, Mass.; Wm. Dawson & Sons, Ltd., London, W.C.2. 1949. pp. xxii + 242. Many refs. Price $6.00.

This monograph, which combines original work by the authors with a synthesis of new concepts from previous publications, contains chapters as follows: introduction, with a review of main sources; structure of water; properties of solutions; osmosis and osmotic pressure; the mechanism of osmosis; water as a plant component—intracellular distribution of water; the osmotic quantities of plant cells; active cell water relations; uptake and movement of water in plants; water loss and water retention. The bibliography contains 780 items.

2505. CHENERY, E. M. **Aluminium in the plant world.** *Kew Bull.* No. 4, 1949 (463–73). 20 refs.

Presents the results of a large number of tests on monocotyledons, gymnosperms and cryptogams. Fifty-two species of gymnosperm, representing every living genus, were tested. A noteworthy point was the complete absence of aluminium-accumulators among the Coniferae. [Cf. *For. Abstr.* 10 (No. 899).]

2506. CHINOY, J. J. **A new colorimetric method for the determination of starch in leaves and woody tissues of plants.** *Indian Journal of Agricultural Science, Delhi* 17 (5), 1947 (261–8). 11 refs. H.S.B.

Describes a sensitive method, whereby the starch-iodide colour is developed by the addition of KI and H_2O_2 in requisite quantities to generate a slight excess of free iodine.

2507. MEEUSE, B. J. D. **Observations on the enzymatic action of Maple and Birch saps.** *New Phytol.* 48 (2), 1948 (125–42). 41 refs. O.R.S.

The presence of amylases was demonstrated in the sap of both Maple and Birch.

2508. KING, B. C., and SCHWARTING, A. E. **The occurrence of rutin in *Sambucus canadensis*.** *J. Amer. pharm. Ass.* (*sci. Ed.*) 38 (9), 1949 (531–2). 3 refs. O.R.S.

Rutin was isolated from the fresh leaves and flowers. There was a progressive rise in rutin content during the growing season until the fruiting stage.

2509. BAKER, W. **Occurrence of dulcitol as exudate from *Euonymus japonicus* and *E. europaeus*.** *Nature, Lond.* 164 (4182), 1949 (1093–4). [Dept. of Organic Chemistry, University, Bristol.]

2510. PLOUVIER, V. Sur la présence de pinitol dans quelques Légumineuses. **[The presence of pinitol in some Leguminosae.]** *C.R. Acad. Sci., Paris* 228 (10), 1949 (859–61). 1 ref. [F.] D.S.I.R.

Pinitol was obtained by acetone extraction from twigs, leaves, flowers or fruits of 72 species from 43 genera, including a number of trees and shrubs.

2511. DOUGLASS, C. D., HOWARD, W. L., and WENDER, S. H. **The isolation of isoquercitrin [, a flavonoid pigment,] from the seed pods of *Cercis canadensis*.** *J. Amer. chem. Soc.* 71 (8), 1949 (2658–9). [University of Oklahoma.] O.R.S.

2512. DIOS, R., and VIEITEZ, M. G. Contribución al estudio de los aceites vegetales en dependencia con el clima y suelo. I. Aceite de *Camellia japónica* L. **[Vegetable oils in relationship to climate and soil. I. Oil of *Camellia japonica*.]** *An. Edafol. Fisiol. veg.* 8 (6), 1949 (791–810). 51 refs. [Span.span.e.] E.M.B.

A chemical analysis was made of the seed oil of *Camellia japonica* in Galicia, in conjunction with a study of the climate and soil of the habitat. The princi l constants do not differ greatly from those of oil from other geographical

zones, except for the OH and non-saponification indexes, which are high.

2513. YOUNG, H. E. **Carbohydrate absorption by roots of *Pinus taeda*.** *Bull. Dep. Agric. Qd.* (*n.s.*) No. 34, 1947 (1–6). 4 refs. (*Repr.* from *Queensland Journal of Agricultural Science, Brisbane* 4(1/2), 1947.)

Experiments were designed and carried out with the object of determining whether carbohydrates obtained from insoluble cellulose material can be made available to Pine plants with the aid of their mycorrhizal fungi. Seedlings of *Pinus taeda* were used as test plants. An attempt was made to grow seedlings of this species under aseptic conditions in a CO_2-free atmosphere with various sources of carbohydrate supplied in the rooting medium. It was shown that seedlings of *P. taeda* can exist and grow in a CO_2-free atmosphere and that the fungus *Boletus granulatus* is capable of providing Pine roots with a carbohydrate supply derived from cellulose (chopped filter paper) and suitable for Pine nutrition. Maltose supplied in solution supports growth much longer than sugar-free media, but not for so long and not so well as that provided by mycotrophic means. It was also shown that mycorrhizae with the aid of organic matter are able to supply carbohydrate to the plants through the roots and that this supply can be at least accessory to that supplied by photosynthetic activities.

2514. SOSA-BOURDOUIL, C. Sur l'absorption de l'eau par les rameaux de *Ginkgo biloba* L. [**The absorption of water by twigs of *G. biloba*.**] *Bulletin du Muséum National d'Histoire Naturelle, Paris* (*2e série*) 20 (4), 1948 (427–9). [F.] L.S.

Twigs taken from the same branch during the winter resting period and all having a terminal bud, were tested in the laboratory for their absorption of water at various temperatures. The results are represented in graphs. Twigs with a male bud took up less water than those with a female bud or buds having no inflorescence. The results demonstrate clearly the unusual capacity of *G. biloba* for absorbing large quantities of water.

2515. MÜLLER, D. Arbeitsteilung im Buchenholz. [**'Division of labour' in Beech wood.**] *Physiol. Plant., Copenhagen* 2 (4), 1949 (297–9). 8 refs. [G.g.]

By spraying an 0·1% light green solution on the cut surface of summer-felled Beech (*Fagus sylvatica*) while it still had its leaves on, it was ascertained that the transpiration stream ascends most rapidly in the two most recent annual rings, and that in 30- to 48-year-old Beech, it ascends only in the 13–24 most recent rings.

12.11.2. *Reproduction. Propagation. Growth. Development*

See also *For. Abstr.* 11 (Nos. 2546, 2701, 2813–6, 3361).

2516. O'ROURKE, F. L., and MAXON, M. A. **Effect of particle size of vermiculite media on the rooting of cuttings.** *Proceedings of the American Society for Horticultural Science, E. Lansing* No. 51, 1948 (654–6). 2 refs. [Michigan State College, E. Lansing.] E.M.B.

Describes experiments in rooting cuttings of ornamental deciduous shrubs in exfoliated vermiculite, a micaceous mineral expanded by heating and processed in 5 particle sizes. The No. 2 particle size, with an average diameter of 2–3 mm., proved satisfactory.

2517. PRIDHAM, A. M. S. **Comparison of quartz sand, cinders and vermiculite in rooting of evergreen cuttings.** *Proceedings of the American Society for Horticultural Science, E. Lansing* No. 51, 1948 (657–8). [Cornell University, Ithaca.] E.M.B.

Tests were made with cuttings of *Juniperus chinensis pfitzeriana* and *Thuja orientalis*, some treated and some untreated with growth regulator. The influence of the rooting medium was small. Cinders proved consistently the best, vermiculite second, and quartz sand third. Greatest and earliest rooting occurred with treated cuttings. [Cf. *For. Abstr.* 10 (No. 909), 11 (No. 871).]

2518. MYHRE, A. S., and SCHWARTZE, C. D. **Rooting evergreen cuttings with hormones.** *Proceedings of the American Society for Horticultural Science, E. Lansing* No. 51, 1948 (639–50). 7 refs. [Western Washington Experiment Station, Puyallup.] E.M.B.

Summarizes experiments (with both hardwoods and softwoods) over a period of 5 years. Rooting was accelerated after 24-hour treatments with indolebutyric-acid solutions at concentrations of 60 and 80 parts per million parts of water [cf. *For. Abstr.* 8 (No. 899)].

A species of Yew (*Taxus baccata aurea*) responded better to naphthaleneacetic than to indolebutyric acid. Treatments with powder preparations did not produce such good results as solutions. The hormones available in commercial powder forms do not appear to be sufficiently concentrated for optimum effects on these types of cutting. Most of the species rooted equally well in sand and sand/peat : but *Camellia japonica*, and *Ilex aquifolium* responded better in sand/peat and *Chamaecyparis plumosa aurea* and *Juniperus hibernica* in pure sand. *From authors' summary.*

2519. Stewart, D. N. **Response of Colorado Blue Spruce [*Picea pungens*] and Engelmann Spruce [*P. engelmanni*] cuttings to hormone solutions.** *Abstr.* in *Proceedings of the Montana Academy of Sciences* 7/8, [1948?] (39).

One- and two-year-old cuttings from 30-year-old Colorado Blue Spruce and Engelmann Spruce were treated with 10 hormone solutions. Soil, sand, and distilled water were used as the rooting media. The use of hormones did not result in increased callus formation, and some of the hormones were harmful. Twigs standing in distilled water or hormone solution showed better callus formation than those in sand. The 2-year-old twigs formed callus as readily as the 1-year-old. The presence of a fungus [not specified] on the basal ends of the twigs in the solutions seemed to accelerate the formation of callus.

2520. Hajek, R. Razmnažanje četinara pelcerima i kalemlenjem. **[Propagation of conifers by cuttings and grafting.]** *Šum. List* 72 (8), 1948 (278–9). [Croat.]

A brief account of methods used in horticulture and applicable to Jugoslav conditions. Recommendations include: the use of cuttings sufficiently mature to show the characteristics it is desired to propagate; selecting cuttings of straight-growing, pyramidal species only from the topmost shoots; planting cuttings (in wooden boxes) only in August and September, unless they can be planted under glass with controlled temperature, when October and November are suitable; transplanting cuttings every 2 years, to encourage strong, compact root systems; the forcing of cuttings of *Taxus*, *Abies* and *Picea* spp. (which are slower to develop than *Chamaecyparis* or *Thuja*) under glass, whereby October and November cuttings can be transplanted next April or May. Cuttings of *Chamaecyparis*, *Juniperus* and *Thuja* may be taken by tearing off from the older branches small side branches with a heel which is shortened to ½ cm. As regards grafting, recommendations are: the selection of strong 3- to 4-year-old seedlings for stock and their nursing for one year in pots, with 3–4 weeks under glass at 15–18° C., before grafting; and leaving the grafts a whole year in their pots before transplanting.

2521. **Vegetative propagation [of *Pinus radiata*.]** *Rep. N.Z. For. Serv. 1948–9*, 1949 (29).

Planting was done in June 1948, using 400 cuttings of each of several types of shoot, 200 being heeled cuttings (i.e. torn off the tree with a fragment of the parent stem), and 200 unheeled cuttings (i.e. removed from the tree by a clean cut). Half of each were treated with a hormone preparation and half left untreated. These units of 100 cuttings were broken into sets of 25 and planted in random blocks in the nursery beds. The interim results can be summarized as follows:—(1) Survival % was about the same (60–70) for all types of shoot used (cut tops of one-year-old seedlings, first-order laterals from 2-year-old trees, ditto from 5-year-old trees, 2nd-order laterals from 5-year-old trees, and ditto from 7-year-old trees). (2) There was no significant difference between results from heeled and unheeled cuttings. (3) If the weather was favourable, August plantings were as successful as those in June. (4) The part of the experiment dealing with hormones was not handled as systematically as could be desired, and repetition is necessary.

2522. **Vegetative reproduction of Monterey Pine, Eucalypts, and *Leptospermum*.** *Rep. For. Timb. Bur. Aust. 1948*, 1949 (13–4).

Endeavours to improve the technique of growing *Pinus radiata* from cuttings were continued [cf. *For. Abstr.* 11 (No. 80)]. Tubes 6 in. long were found as satisfactory as those 8 in. long, provided that they were at least 1½ in. in diameter. Although there was a difference of temperature within the tubes when painted black or white, it did not appear to be enough to influence rooting. Standing the tubes in a 1½-in. layer of sawdust slightly reduced the strike. Plunging the tubes 2 in. or more into the soil was found to reduce height growth and root development; best results were obtained

with the tubes set not more than ½ in. in the soil. No significant difference in strike or growth was found between tubes set on the ground and tubes placed on a bed of bricks, but cuttings set on concrete gave poorer results than those set in nursery soil. It appears to be advantageous to place the tubes in rows 9 in. apart rather than in solid blocks. Cuttings 6 in. long gave the best results, and it is apparently important not to set them more than half their length in the tube. The best strikes were obtained with tubes filled with sedge peat plus nursery compost, pure stable manure, stable manure with nursery compost, decomposed needle litter with nursery compost, and sedge peat alone. Nursery compost or nursery soil with sawdust gave bad results.

As a result of chemical treatment, cuttings from 21-year-old trees were successfully rooted. Previously no success had been obtained with cuttings from trees over 11 years of age. The success of the chemical treatments tried was in the following order:—β-naphthoxyacetic acid, indolebutyric acid, naphthaleneacetic acid, methylphenoxyacetic acid, 2,4-dichlorophenoxyacetic acid, 2-naphthylacetic acid, indoleacetic acid. The use of sugar and vitamin B1 with these growth regulators appeared to improve the strike slightly.

Slicing the bark from the side of the cuttings did not affect the development of roots. In all cases roots originated near the base of the stem. It was found that if kept moist and under cover, cuttings can be stored for as long as 5 months without losing the ability to form roots, but the % of strike gradually diminished with time.

Very careful control of the factors of humidity and temperature appears to be necessary to enable Eucalypts to strike. *E. macrorrhyncha* *E. dives* and *E. dalrympleana* showed highest promise, but most cuttings die from desiccation or fungal attack despite the use of shade or hothouses. Endeavours to graft twigs from old Eucalypts on to young stock failed.

Cuttings of *Leptospermum citratum* soaked in various solutions of growth-regulating substances with vitamin B1 and sugar and set in electrically heated beds gave excellent results.

2523. MARCEL. Essais de multiplication végétative du châtaignier. **[Experiments in the vegetative propagation of Chestnut.]** *C.R. Acad. Agric. France* 35 (8), 1949 (342–3). [F.] [Station Centrale de Pathologie végétale, Versailles.] A.P.B.

Describes a method of layering Chestnut [*Castanea sativa*], based on the etiolation method of Knight, Feilden and Garner. A space is cleared around the stock, removing about 10 cm. of soil and replacing it by sandy leafmould or by the top layer of a heath soil. The shoots root more easily in a soil mixture of pH 4·5–5·5. When the sap begins to circulate, the shoots are pegged down and covered with a few cm. of the soil mixture. The beds are kept slightly damp by watering. In December, after leaf-fall, the rooted shoots are removed. In the experiments described 75% of the shoots had rooted.

2524. BRETZ, T. W. **Leaf-bud cuttings as a means of propagating disease-resistant Elms.** *Plant Dis. Reptr.* 33 (11), 1949 (434–6). A.P.B.

A preliminary report on an investigation into means of propagating Elms from cuttings. The most satisfactory results were obtained with leaf-bud cuttings consisting of leaf-blade, axillary bud and a shield of stem tissue, collected in May or June. These were treated with a commercial 'hormone' dust before planting in either river sand or puffed mica. The maintenance of a supersaturated atmosphere in the propagation chambers by means of a constant mist-spray, was found necessary to keep the cuttings turgid. The method has proved successful with a miscellaneous collection of *Ulmus americana*, *U. pumila*, *U. thomasi* and *U. fulva*. [Cf. *For. Abstr.* 9 (No. 1453).]

2525. BRETZ, T. W., and SWINGLE, R. U. **Experimental propagation of disease-resistant Elm selections by vegetative cuttings.** *Abstr.* in *Phytopathology* 40 (1), 1950 (4).

The 'Christine Buisman' Elm was propagated best from root cuttings collected during the dormant season. Selections from *U. americana* were propagated most satisfactorily from softwood stem cuttings or leaf-bud cuttings with a 'heel' of stem tissue, collected in early summer and subjected to a constant water mist. The highest % of root strike and the most vigorous rooting were obtained with leaf-bud cuttings treated with rooting compounds. Dormant stem cuttings were generally unsatisfactory. *U. thomasi*, *U. pumila*, and *U. fulva*

were propagated successfully by means of leaf-bud cuttings, and preliminary trials using this method with hybrid *Castanea* have given promising results.

2526. White, D. G. **Propagation of Bamboo by branch cuttings.** *Proceedings of the American Society for Horticultural Science, E. Lansing* 50, 1947 (392–4). 3 refs. [Federal Experiment Station, Mayaguez, Puerto Rico.] E.M.B.

Various species of Bamboo were tested, cuttings being taken from 2-year culms at 3-monthly intervals over a period of a year, and planted in moist sand in a greenhouse. The branches were removed with a hacksaw as close as possible to the culm. Root-promoting treatments had no apparent effect on rooting in any species. No cuttings of *Bambusa tuldoides* or of *Cephalostachyum pergracile* rooted in any trial. About half those of *Gigantochloa verticillata* (except those taken in September) rooted. *Sinocalamus oldhami* gave some rooted cuttings in all the trials. September was a bad month for all species. December and March were best for all except *B. textilis*. Rainfall in the preceding month seemed to be an important factor. [Cf. *For. Abstr.* 11 (No. 2671).]

2527. Slankis, V. Wirkung von β-Indolylessigsäure auf die dichotomische Verzweigung isolierter Wurzeln von *Pinus sylvestris*. **[Effect of β-indolylacetic acid on the dichotomous branching of isolated roots of *P. sylvestris*.]** *Svensk bot. Tidskr.* 43 (2/3), 1949 (603–7). 6 refs. [G.] O.B.D.

Isolated roots were cultured in 100-ml. Erlenmeyer flasks containing 20 ml. of nutrient solution to which varying amounts of β-indolylacetic acid (IA) had been added. A marked stimulation in the formation of rootlets was observed, the effect being greatest in mixtures containing 70–125γ of IA per 20 ml. of nutrient solution. Forking of the rootlets took place in degrees varying with the amount of IA present in the solution and was greatest in solutions having 30–100γ of IA per 20 ml. At these concentrations the branched rootlets tended to be long and slender, whereas at higher concentrations they were thicker and shorter. In flasks containing 50–200γ of IA no root-hairs were formed on the rootlets or their ramifications. [Cf. *For. Abstr.* 10 (No. 2423); 11 (No. 873).]

2528. Funke, G. L. **Phenomena of correlation in the growth of leaves.** *Rec. Trav. bot. néerland.* 41, 1946–1948 (80–100). 39 refs. [E.e.] O.B.D.

A study of abnormal enlargement of leaves on branches deprived of all buds save one. When the branches were left on the tree the abnormally large size was attained by cell division. On branches cut off from the trees, most species achieved the correlative enlargement by cell stretching.

12.11.3. *Heredity. Breeding. Hybridization. Races and Questions of Provenance. Cytology*

See also *For. Abstr.* 11 (Nos. 2800, 3172, 3243).

2529. Arnborg, T. Växtförädling i svenskt skogsbruk. **[Tree breeding in Swedish forestry [: a general review].]** *Svenska SkogsvFören. Tidskr.* 46 (6), 1948 (359–77). 21 refs. [Sw.e.]

2530. **Hybrid tree breeding.** *Fibre Contain.* 34 (7), 1949 (70–1). P.R.

A summary account of its development since 1924 and of recent research in the U.S.A.

2531. Duffield, J. W. **Techniques and possibilities for Douglas-Fir breeding.** *J. For.* 48 (1), 1950 (41–5). 18 refs.

A technique for controlling pollination in *Pseudotsuga* is described. Production of apparently normal cones by Douglas Fir depends little on the type of pollination and is no indication of success in producing sound seed. Self fertility appears to be low. The interspecies cross *P. taxifolia* × *macrocarpa* appears to be rather hard to make.

2532. Isaac, L. **Better Douglas Fir forests from better seed.** University of Washington Press, Seattle. 1949. pp. 65 + 2 maps. 65 refs.

A review of existing knowledge of local races of Douglas Fir, the best strains for planting, seed collection and storage, and possibilities of improvement by breeding, all with reference to the Pacific North-west.

2533. Graves, A. H. **Breeding Chestnut trees: report for 1946, and 1947.** *Annual Report, Northern Nutgrowers Association Inc.* No. 38, 1947 (85–91). C.G.B.

A summary of work accomplished in breeding disease-resistant Chestnut by the Connecticut Geological and Natural History Survey and the Connecticut Agricultural Experiment Station in co-operation with U.S. Department of Agriculture, Division of Forest Pathology.

2534. **Dwarf and low-growing or slow-growing plants.** *Brooklyn bot. Gdn. Rec.* (*n.s.*) 5 (3), 1949 (129–92).

This special number includes articles on:—a pigmy Hemlock (*Tsuga canadensis* var. *minuta*); artificially dwarfed trees; a dwarf clone of *Picea pungens* var. *glauca*; and a short article by A. Rehder on a compact form of Colorado Spruce (*P. pungens* f. *compacta*), to clear up the status and history of this form, which he named in 1915, but which has frequently been confused with other dwarf forms of *P. pungens*.

2535. Ross, J. G., and Duncan, R. E. **Cytological evidences of hybridization between *Juniperus virginiana* and *J. horizontalis*.** *Bull. Torrey bot. Cl.* 76 (6), 1949 (414–29). 17 refs. [University of Wisconsin, Madison.] O.B.D.

2536. Varma, J. C. **A study of the variation of morphological characters within tree species with special reference to European Larch of different provenances (*Larix decidua* Mill.).** *Forestry* 23 (1), 1949 (20–30). 11 refs.

Provenance experiments on races of European Larch at Halfway and Mynydd Ddu, Wales, have been studied. The race Darnaway (Scotland) has proved to be the best, and the race Austria (Inn Valley) the worst. The length of branches is a morphological character which distinguishes the race; the angle of branching does not. Height growth is also a racial character and may be used to separate races under similar soil and vegetation conditions. There are significant differences between provenances in respect of straightness of stem and liability to lose leading shoots. *Author's summary.*

2537. Baldwin, H. I. **Four years growth of European Larch of different origins.** *Fox For. Notes N.H. For. Dep.* No. 41, 1949. pp. 1.

In May 1946, seed of European Larch from 47 sources in Europe, representing all extremes of the natural and planted range of this species, were sown in Fox Forest Nursery, New Hampshire, and the seedlings transplanted in April, 1948. Average height of all lots (916 plants) in Oct. 1949 was 2·25 ft. There are indications that seed collected at the higher elevations and at the colder localities in the lowland, resulted in slower growing plants than those from medium elevations in Central Europe. Seed from Poland and medium elevations in Austria and Czechoslovakia have so far exhibited the most rapid growth.

2538. Baldwin, H. I. **Height growth of Norway Spruce.** *Fox For. Notes N.H. For. Dep.* No. 38, 1949. pp. 2.

Picea abies seed from a number of European provenances was sown at the experimental nursery at Fox Forest, New Hampshire, 1933–8, and planted out on adjacent plots. The largest series consisted of the International Union of Forest Research Organizations' samples collected in 1937 and sown in 1938 [cf. *For. Abstr.* 11 (No. 92)]. Measurements were made in the autumn of 1948. A striking characteristic of the height data was the wide range of heights within one plot, trees varying from 1 ft. to 8 ft. for instance. Consequently, significant height differences between plots varying only in origin of seed could rarely be established. In general, Norway Spruce planted on good sites in southern New Hampshire grew 0·5–0·75 ft. per year in height during the first 7 or 8 years after planting, and thereafter much more rapidly. Seed of Central European provenances showed the best growth in most cases. Northern provenances such as Finland and Norway were usually slower in growth. No distinctive growth form or special resistance to insects etc. due to source, could be detected.

2539. Delevoy, G. Contribution à l'étude de quelques variétés du *Pinus nigra* Arn. en Belgique. **[Notes on some varieties of *Pinus nigra* in Belgium.]** *Bull. Soc. for. Belg.* 57 (2), 1950 (49–63). [F.]

Analyses sample-plot data for *Pinus nigra* of several provenances at different stations in Belgium. The index of comparison used was mean height in metres of dominants at 30 years of age; the figure for different provenances was:—9–16 for Corsican, 6–16 for Flemish, 8–14 for Calabrian and Crimean, and 8–12 for

Austrian, on calcareous soil. More detailed data are given on the comparative performance of Corsican and Austrian Pine, which shows that the former is somewhat the more productive on good soils, but that the latter should be very profitable on poor marginal soils. [Cf. *For. Abstr.* 11 (No. 2622).]

2540. Covas, G. Estudios cariológicos en Antófitas. III Parte. [**Karyological studies on phanerogams. Part III.**] *Darwiniana, B. Aires* 9 (1), 1949 (158–62). 2 refs. [Span.] A.P.B.

A list of chromosome numbers in 21 species.

2541. Krishnaswamy, N., and Raman, V. S. **A note on the chromosome numbers of some economic plants of India.** *Curr. Sci.* 18 (10), 1949 (376–8). 3 refs. A.P.B.

Includes *Garcinia speciosa, Swietenia mahagoni,* and *Mangifera indica.*

12.11.6. *Phenomena of Movement*

See also *For. Abstr.* 11 (No. 2813).

2542. Wildeman, E. de. Conflit entre l'action des tropismes et de facteurs physiques chez les végétaux. [**Conflict between the action of tropisms and physical factors in plants.**] *Bulletin de la Classe des Sciences, Académie Royale de Belgique, Bruxelles* (*5th Ser.*) 33, 1947 (39–43). [F.] L.S.

Quotes *Sorbus aucuparia* as an example of the way in which leaves, inflorescences and fruit of a tree may occupy (according to the season or their state of development) positions at times positively and at other times negatively geotropic.

12.13. Embryology

2543. Schubert, G. H. **Quintuplet seedlings in a Sugar Pine seed.** *J. For.* 48 (2), 1950 (128–9). 2 refs.

Reports a case of polyembryony in *Pinus lambertiana.* [Cf. *For. Abstr.* 3 (p. 29).]

2544. Dnyansagar, V. R. **Embryological studies in the Leguminosae. 1. Contribution to the embryology of *Leucaena glauca* Benth.** *J. Indian bot. Soc.* 28 (2), 1949 (95–107). 19 refs. O.B.D.

12.14. Organography. Morphology. Anatomy. Histology

See also *For. Abstr.* 11 (Nos. 2588, 2590, 2734–47).

2545. Gautheret, R. J. Sur la culture indéfinie des tissues de *Salix caprea.* [**The continuous culture of tissues of *Salix caprea.***] *Comptes Rendus des Séances de la Société de Biologie et de ses Filiales, Paris* 142 (11/2), 1948 (807–8). 4 refs. [F.] I.I.E.

Describes the successful culture of tissue of *Salix caprea,* stock being obtained which has proliferated for 26 months and has furnished 12 'transplants'.

2546. Bolli, M. Ovoli artificiali nei rami di olivo. [**Artificial buds on Olive branches.**] *Ital. agric.* 87 (1), 1950 (42–5). [It.] E.M.B.

In a previous article the author had put forward a theory that the formation of buds in the Olive is probably a consequence of the closing of the sieve tubes, which in the Olive have a peculiar histological character favouring this phenomenon. With a view to proving this experimentally he attempted to induce bud formation by strangulation of branches 3–4 years old. This was done at the beginning of May 1949, and when the branches were examined in the middle of the following November, it was seen that, in every case, hyperplasies very like natural buds had formed above the ligature. Dissection of some of these branches showed that these excrescences were formed of an almost undifferentiated parenchymatous tissue, the cells of which were filled with starch as in normal buds.

2547. Huber, B. Zur Phylogenie des Jahrringbaues der Rinde. [**The phylogeny of annual ring structure in bark [of conifers].**] *Svensk bot. Tidskr.* 43 (2/3), 1949 (376–82). 16 refs. [G.g.] O.B.D.

2548. Tobler, F. Über die Verholzung von Bastfasern. [**The lignification of bast fibres.**] *Experientia, Basle* 5 (10), 1949 (398–401). 16 refs. [G.e.] [Eidgenössische Materialprüfungs- und Versuchsanstalt, St. Gallen.] O.R.S.

Lignification of bast fibres in flax begins in the middle lamella of the cell wall. The degree of lignification depends upon more than one outward factor, such as age of the plant, strain

or site. It also has a close connexion with retting qualities.

12.19. Geographical Distribution. Plant Geography and Sociology.

See also *For. Abstr.* 11 (Nos. 2614, 2647).

2549. PURI, G. S. **The historical factor and its application to forest ecology.** *J. Indian bot. Soc.* 28 (2), 1949 (63–8). 24 refs.
Cf. *For. Abstr.* 11 (No. 196).

2550. MCARTHUR, W. M. **The genus *Araucaria* in its geographical aspects.** *Research Report, Geographical Laboratory, University of Western Australia* No. 5, 1949. pp. 7. 12 refs.
Present distribution and uses.

2551. AREND, J. L. **Influence of fire and soil on distribution of Eastern Redcedar in the Ozarks.** *J. For.* 48 (2), 1950 (129–30). 2 refs.
The distribution of *Juniperus virginiana* is so closely correlated with shallow limestone soils and rough topography that these sites are often considered the characteristic habitat of the tree. Systematic observations in the Arkansas Ozarks indicate, however, that Red Cedar does not prefer these shallow soils, but that competition and fire wipe it out on the better sites. Contrary to general belief, soil acidity appears to have little effect on the distribution of this species. The reduced acidity of the soil under dense and long-established stands of Eastern Red Cedar probably results from the relatively high Ca content of its foliage.

2552. [GONZALES ESPARCIA, E.]: TAYLOR, SIR W. L. **Some notes on *Pinus laricio* (Poir) in Spain.** *Forestry* 23 (1), 1949 (15–9). 2 refs.
Notes on the varieties and distribution of *Pinus nigra* in Spain, compiled from a paper by E. Gonzales Esparcia. In Spain *P. nigra* is a mid-mountain species, at its best at elevations of 1,000–1,500 m. The most important stands occur on the calcareous clays of the Cretaceous and Jurassic formations, but the species also tolerates siliceous soils. A marked characteristic of Spanish types of *P. nigra*, in spite of their resistance to drought, is their toleration of shade. It is not unusual to find young trees growing well, and retaining 15–20 whorls of green branches, for more than 20 years beneath the shade of an overwood; and on sunny slopes an understorey may frequently be found beneath the canopy of older trees. With slight differences the Spanish varieties resemble Corsican Pine. Seeds run 31,000 to the kg. and seed years are irregular. They are perhaps the longest-lived Pines in Spain.
Spanish forest ecologists incline to think that large parts of the area now occupied by *P. nigra* formerly bore a *Quercetum* climax which, as a result of biotic interference, has been replaced by the *Pinus*. Further regression leads to the replacement of *P. nigra* by *P. sylvestris* and *P. pinaster*.
P. nigra forest in Spain is usually treated by successive uniform fellings. The rotation is 120 years, with a regeneration period of 20 years. But difficulties have been met in trying to obtain natural regeneration within the stipulated period, and an extension to 30 years is being sought.

2553. SEALY, J. R. ***Arbutus unedo*.** *J. Ecol.* 37 (2), 1949 (365–88 + 6 photos). 54 refs.
A detailed study of the ecology of *A. unedo* at Killarney, an account of its general distribution, and a discussion of its origin in Ireland.

2554. KUSTER, A. Über die Grenzen der Buchenverbreitung im Veltlin. **[The limits of distribution of Beech in the Valteline.]** *Schweiz. Z. Forstw.* 101 (1), 1950 (44–51). 15 refs. [G.f.]
The author enumerates the spots where Beech occurs in the Valteline, and concludes that the limits of its distribution are determined by climate. The limiting factor is not precipitation but the diminution in atmospheric humidity from Lake Como towards the upper valleys of the Adda and Mera. The author believes that the critical minimum for Beech is a mean relative humidity of *ca.* 65% during the months Feb.–May. The low levels of relative humidity (down to 30%) which frequently accompany the northerly foehn wind in spring, are the reason for the absence of Beech from certain valleys in this region.

12.19.1. *Regional Floras, including Check Lists*

2555. CHAPMAN, E. F. **Cyprus trees and shrubs.** Government Printing Office, Nicosia. 1949. pp. 88.

2556. Bailey, V. L., and Bailey, H. E. **Woody plants of the Western National Parks, containing keys for the identification of trees and shrubs.** University Press, Notre Dame, Ind. 1949. pp. 274. Many refs. (*Amer. Midl. Nat. Monograph*, No. 4.)

12.19.2-3. *Vegetation Types*

See also *For. Abstr.* 11 (Nos. 2464–5, 2493, 3412–3).

2557. Tschermak, L. Hohe Lage der oberen Wald- und Baumgrenze in den Innenalpen und Klimacharakter. **[The height of the timberline in the central Alps and the nature of the climate.]** *Wetter und Leben, Vienna* 1 (8), 1948 (225–30). [G.] L.S.

Discusses causes of the greater height of the timberline in the central Alps compared with that of the outer Alps, and gives some analogies from other countries. The climate of the central Alps approaches the continental, while that of the outer Alps is more oceanic in character, with lack of summer heat, higher rainfall, greater depths of snow and stronger winds. These factors give rise to marked differences in the vegetation types and in the timberline of the two zones.

2558. Galoux, A. La forêt vierge de Boubin (Kubany) (Bohême). **[The virgin forest of Boubin (Kubany) in Bohemia.]** *Bull. Soc. for. Belg.* 56 (12), 1949 (489–511). 13 refs. [F.]

Describes the plant associations, soil profiles, altitudinal distribution of species, and stand structure. At lower altitudes the forest belongs to the *Fagion silvaticae* association and higher up (above 1,000 m.) comes the transition to *Vaccinio-Piceion.* A striking difference between this forest and the usual artificial stand, is the far higher degree of illumination within the stand and the much richer ground vegetation.

2559. Soó, R. von. Közép-Erdély erdei növényszövetkezetei és azok jellemzö (charakter)-fajai. **[The forest associations of central Transylvania and their indicator species.]** *Erdész. Kisérl.* 47, 1947 (1–58). 89 refs. [Hu.g.]

2560. Felföldy, L. Növényszociológiai és oikológiai vizsgálatok nyírségi akácosban. **[Phytosociological and ecological study of a *Robinia pseudoacacia* forest near Nyírség, Hungary.]** *Erdész. Kisérl.* 47, 1947 (59–86). 20 refs. [Hu.f.]

The author distinguishes 3 facies of the *Robinietum pseudacaciae*: (1) the *Bromus sterilis*, (2) the *Poa angustifolia*, and (3) the *Urtica dioica* facies, each of which is described in detail. The second part of the paper deals with the microclimate of different facies and of different strata in the forest.

2561. Duchaufour, P. Recherches écologiques sur la chênaie atlantique française. **[Ecological studies of the French Atlantic Oak forest.]** *Ann. Éc. Eaux For. Nancy* 11 (1), 1948. pp. 332 + 27 photos, 8 dgms. 233 refs. [F.]

Ecologists and foresters have long been struck by the frequent occurrence of heathland in the French Atlantic region. The forest appears to be in a state of unstable equilibrium and shows a tendency to became degraded and develop in the direction of heathland. The present monograph reports the results of a detailed study of the variations in soil which accompany this development of forest associations, and attempts to disentangle the reciprocal influences of soil on vegetation and vegetation on soil in the course of this double evolution. The following are the main divisions of the work:—Part I: ch. 1—object and methods of study (10 pp.); ch. 2—ecological and floristic characters of the regions studied (14 pp.). Part II: ch. 1—the soils and associations of the Loire basin (77 pp.); ch. 2—ditto, Brittany (55 pp.); ch. 3—ditto, landes of Gascony (60 pp.). Part III: ch. 1—the regressive evolution of soils and of associations in the atlantic climate (30 pp.); ch. 2—the progressive evolution of soils and of associations in the atlantic climate (7 pp.); ch. 3—the question of climax in the atlantic region (7 pp.). An appendix (6 pp.) discusses the bearing of the ecological and edaphic data on the improvement of degraded forest and heathland in the atlantic region.

The general conclusions reached are, very briefly, as follows:—The degradation of the forest and its replacement by heathland is, in the great majority of cases, accompanied by leaching of the soil and even by genuine podzolization. This process occurs spontaneously only in certain conditions, i.e. a

sandy or gravelly subsoil, very permeable and poor in absorbent substances, and a very damp climate. For defining types of forest humus, the author found the C/N ratio more useful than the pH. The latter is satisfactory for extreme types, but soils with a medium pH (5) may belong to either mull or mor type, and only the C/N ratio enables one to determine which. In the atlantic climate, podzolization is not, as it is in the boreal region, a general and inescapable phenomenon, and it takes place only under a vegetative cover formed by certain Coniferae (Pines) and Ericaceae. Two fundamental phases are distinguished in the process of leaching; the first phase, in broadleaved (Oak) forest, is a purely mechanical removal of electro-negative colloids, which is of little importance so long as the forest is in a state of equilibrium with the soil; it is accelerated by the intervention of a disturbing factor, and the impoverishment of the absorbent complex of the upper horizons which then occurs, prepares the way for the second phase. This second phase, associated with heathland, is a chemical podzolization caused by the humic colloids of a high C/N produced by *Calluna*. In an atlantic climate, therefore, it is heath which produces podzolization and not *vice versa*.

The author develops a classification of podzols as a function of the variations in level of the water table, and also analyses the difference in rate of podzolization according to different parent rocks.

It is held that the reforestation of paraclimatic heaths is very difficult and their restoration to the broadleaved climax is impossible, but that the restoration of young heaths, resulting from a recent degradation of the forest, is easier. For this purpose, the use is recommended of conifers less acidifying than the Pines that are usually employed, in mixture with nitrogen-fixing broadleaved species. Among the species recommended are *Abies alba*, *A. nordmanniana*, *A. grandis*, *Tsuga heterophylla* and *Pseudotsuga taxifolia*. [Cf. *For. Abstr.* 11 (No. 2491).]

2562. YEN-TCHENG, T. Études écologiques et phytosociologiques sur les forêts riveraines du Bas-Languedoc. Deuxième partie. Le *Populetum Albae*. **[Ecological and phytosociological studies of the riverain forests of lower Languedoc. Part II. The *Populetum albae*.]** *Vegetatio* 1 (2/3), 1948 (1949) (93–128 + 3 plates + 2 tbls). [F.] A.P.B.

2563. FLORES, F. Estudo fitogeográfico da zona mais ocidental da península de Lisboa. **[Study of plant associations in the most westerly zone of the Lisbon peninsula.]** *Publ. Serv. flor. aquic. Portugal* 10 (1), 1943 (153–9). [Port.e.]

2564. KIVENHEIMO, V. J. Untersuchungen über die Wurzelsysteme der Samenpflanzen in der Bodenvegetation der Wälder Finnlands. **[The root systems of spermatophytes of the ground vegetation of Finnish forests.]** *Annales Botanici Societatis Zoologicae Botanicae fennicae Vanamo, Helsinki* 22 (2), 1947. pp. 180. Numerous refs. [G.fi.] H.S.B.

Presents the results of a detailed analysis of the root systems and conditions of rooting of vegetation in three types of Finnish forest, i.e. Cajander's 'grove' type, 'fresh mossy' forest and 'heath' forest. The investigations consisted of a study of the soils, the anatomy of the roots, and their length, depth of penetration, and spread. The results lead to the general conclusion that the root systems of ground vegetation occupy, on the whole, the same soil horizons as those of the trees, and expose as a fallacy (in these types of forest at least) the assumption that the ground vegetation is an indicator of the soil conditions of the humus layer or the upper horizons only.

2565. ARNBORG, T. Synpunkter på vegetationsanalysen vid undersökningar av nordiska barrskogssamhällen. **[Aspects of vegetational analysis in studying coniferous forests in Scandinavian districts.]** *Svensk bot. Tidskr.* 43 (2/3), 1949 (195–214). 28 refs. [Sw.e.] O.B.D.

A discussion of analytical methods.

2566. MALMSTRÖM, C. Studier över skogstyper och trädslagsfördelning inom Västerbottens län. **[Studies on the forest types and the distribution of tree species in the county of Västerbotten.]** *Medd. Skogsforsknlnst. Stockh.* 37 (11), 1949. pp. 231 + coloured map. 171 refs. [Sw.g.]

Details the results of studies on N. Swedish forest types, begun in 1935 and concentrated from 1937 onwards on those of Västerbotten. After a general introduction, which includes a

review of the more important systems of forest types proposed in the past for northern Europe, succeeding chapters deal with: (1) The environment (topography, soils, climate, human influences). (2) The forest communities (forest types) of the region, their composition, distribution and site conditions. The units selected here correspond roughly to Du Rietz's 'sociations', and are grouped into broader categories by the main features of their ground vegetation. (3) Changes in the types due to (*a*) natural development and (*b*) interference (death or felling of trees; killing of or damage to ground vegetation—e.g. in burning, soil preparation for regeneration, chlorate treatment, grazing; and fertilizing and irrigation). (4) Forest types as indexes to moisture and nutrient conditions (with the conclusion that a good correlation can be shown with moisture, whereas correlations with soil nutrient conditions are extremely complex). (5) The use of forest types in forestry practice (chiefly for biological classification and as pointers to silvicultural treatment; also to indicate site quality, a use for which they are not very suitable in Västerbotten). (6) The author's proposed system of forest types for the region, designed for practical use and aiming at ease of recognition and suitable combinations of important ecological conditions. (7) The tree species and their distribution in the county (illustrated with a coloured map). (8) Reasons for the present distribution of tree species.

There is a 47-page German summary and legends of figures etc. are also translated into German.

2567. Uggla, E. En vegetations-profil på skogsbrandfält i Muddus nationalpark. [**A vegetation analysis in a burnt forest area in the Muddus National Park.**] *Svensk. bot. Tidskr.* 43 (2/3), 1949 (619–32). 24 refs. [Sw.e.] O.B.D.

2568. Julin, E. Vessers udde: mark och vegetation i en igenväxande löväng vid Bjärka-Säby. [**Vessers Udde: soil and vegetation of meadowland with groups of hardwoods, in process of reversion to forest, at Bjärka-Säby.**] *Acta Phytogeographica suecica Uppsala* No. 23, 1948. pp. 186 + 88 pp. of tbls. + maps + 16 plates. 182 refs. [Sw.g.]

A doctoral thesis giving the results of and methods used in a detailed local study of this area, the climax vegetation of which appears to be Oak/Hazel and Scots Pine/Juniper, and which, as a result of the control of grazing, is reverting to forest. The chief sections of the work deal with:—topography, geology, history etc.; soil factors (with special reference to soil fauna and forms of surface humus, but including also much information on soil physics and chemistry); the vegetation, analysed in detail by layers; a summary synecological review of the communities recognized, grouped into 'holocoens' (in Friedrich's sense) characterised mainly by differences in the field layer, soil fauna (worms) and humus types; and a check-list of the flora. The work is abundantly illustrated.

2569. Vural, F. Uladağin Orman rejyonlari. [**Forest regions of Uludağ.**] *Ankara Yüksek Ziraat Enstitüsü Dergisi* 5 (2) (Ser. No. 10), 1946 (323–34). [Turk.]

Impressions of a four-day botanizing tour by the senior students of the Forest Faculty to study the vegetation of the extensive northerly slope of Uludağ, the 'Great Mountain' near Bursa in N.W. Anatolia. The various zones of vegetation, from the Olives and scattered *maquis* near the seashore to the *Abies*/Aspen/Juniper association 300 to 400 m. below the 2,493 m. summit, are described in some detail.

2570. Keay, R. W. J. **An example of Sudan zone vegetation in Nigeria.** *J. Ecol.* 37 (2), 1949 (335–64 + 8 profiles). 20 refs.

An ecological investigation was made in Sokoto Province, Nigeria. The most widespread type is open savanna or open savanna woodland, with fine-leaved and broad-leaved trees in roughly equal proportions, together with a fair number of thorny species. Similar vegetation occurs in the Anglo-Egyptian Sudan. The abundant species are *Anogeissus leiocarpa*, *Combretum glutinosum* and *Strychnos spinosa*. It is concluded, tentatively, that the climatic climax is deciduous woodland with a dense understorey of erect and scandent shrubs, and only occasional patches of grass. Biotic influences (particularly grass fires and cattle) have turned this into open savanna with grass dominant below widely spaced trees. It is, however, possible that these influences are so ancient and widespread that the climax has never been allowed to develop properly during

the present climatic era. *From author's summary.*

2571. EGGELING, W. J. **A review of some vegetational studies in Uganda.** *Uganda Journal* 12 (2), 1948 (139–52). 14 refs. O.G.

2572. MIRANDA, F. Datos sobre la vegetación en la cuenca alta del Papaloapan. [**The vegetation of the upper basin of the Papaloapan.**] *An. Inst. Biol. Univ. Méx.* 19 (2), 1948 (333–64). [Span.] C.G.B.

2573. MARTÍNEZ, M. Algunas observaciones relativas a la flora de Cuicatlan, Oaxaca. [**Some observations on the flora of Cuicatlan, Oaxaca.**] *An. Inst. Biol. Univ. Méx.* 19 (2), 1948 (365–91). [Span.] C.G.B.

2574. COZZO, D. El bosque de Bahía Aguirre en Tierra del Fuego (Argentina). [[**Notes on**] **the forest of Bahía Aguirre in Tierra del Fuego (Argentina).**] *Rev. argent. Agron.* 16 (4), 1949 (193–8). [Span.] E.M.B.

2575. WILLIAMS, R. F. **An ecological study near Beraking Forest Station [Western Australia].** *Journal of the Royal Society of Western Australia (Inc.), Perth* 31, (1944–5) 1948 (19–31). 4 refs. H.S.B.

2576. GILBERT, L. **Botanical notes on the Northern Territory. Part I. The savannah woodlands.** *Victorian Naturalist, Melbourne* 64 (1), 1947 (14–6). O.R.S.

12.19.4. *Succession*

See also *For. Abst.* 11 (Nos. 2561, 2566–8, 2570).

2577. NAGEL, J.-L. Changement d'essences. [**Succession.**] *Schweiz. Z. Forstw.* 101 (2), 1950 (95–104). [F.g.]

After a general discussion of the phenomena of alternation, regression, and succession of species, the author analyses the phenomenon of regression of Spruce in the Fir/Spruce/Beech forests of Neuchâtel. A survey of natural regeneration, made in a forest where the proportion of the 3 species was 66%, 24% and 10% respectively, showed that, of 850 trees, 62% had regeneration of other species under them, 31% the same species, and 7% no regeneration. Fir seedlings were found under 47% of trees, Spruce under 33%, Beech under 13%. The Fir regeneration, usually more vigorous than the Spruce, occurred almost equally under Fir and Spruce. Spruce regeneration, on the other hand, was nearly 8 times as frequent under Fir as under Spruce. It is concluded that, in this area, Spruce regenerates with difficulty under its own cover, probably because its superficial root system drains the surface soil of water and nutrients, and the young trees consequently suffer from drought, especially on southern slopes.

2578. BRINK, V. C., and FARSTAD, L. **Forest advance in North and Central British Columbia.** *Canadian Field-Naturalist, Ottawa* 63 (1), 1949 (37). 2 refs. [University of British Columbia.] L.S.

In northern and central British Columbia the forest is advancing into grassland areas, especially in the intermountain valleys and plateaux between the Coast Range and the Rocky Mountains. The tree commonly characterizing the advance is *Populus tremuloides*, though it is often succeeded by *Pinus contorta*. Other indications, such as the existence of degraded grassland soil profiles in areas now forested, similarly point to an advance, which may be one of long duration. The present stage of the advance, however, seems to have begun within the last 100 years.

2579. CHAPMAN, H. H. **Lightning in the Longleaf.** *Amer. Forests* 56 (1), 1950 (10–1, 34).

Gives the evidence for the theory that *Pinus palustris* represents a fire climax in the Southern States of the U.S.A., and meteorological data to show the probability of lightning's having been the cause of this development long before man-made fires occurred.

2580. ARNOLD, J. F. **Changes in Ponderosa Pine bunchgrass ranges in Northern Arizona resulting from Pine regeneration and grazing.** *J. For.* 48 (2), 1950 (118–26). 11 refs.

Presents experimental evidence demonstrating that on Pine/bunchgrass range:—(1) grass density declines as Pine seedlings become established and develop into saplings; (2) the greater the amount of the 1919 Pine canopy the less at present the total herbaceous cover; and

(3) under protection from grazing, tall bunch-grasses dominate the herbaceous cover whatever the tree cover, but under the heavy grazing practised, they have largely been replaced by plants more resistant to grazing, except under the heavier tree canopies.

12.2. *Special (Systematic) Botany*

12.21. Bacteria. Fungi

See also *For. Abstr.* 11 (Nos. 2481–3, 3278–3302).

2581. SHAFTER, T., and LIMING, O. N. ***Ceratostomella ulmi* types in relation to the development of perithecia.** *Abstr.* in *Phytopathology* 40 (1), 1950 (25).

12.23. Bryophyta

2582. BARROS, G. REIS DE. Briofitos das matas nacionais portuguesas. **[Bryophyta of the Portuguese State forests.]** *Publ. Serv. flor. aquic. Portugal* 10 (1), 1943 (21–31 + 3 plates). [Port.e.]

A short study of bryophytes associated with *Quercus faginea* in the State forests of Vimeiro.

12.25-9. Spermatophyta

2583. GAUSSEN, H. De quoi s'agit-il? Les noms scientifiques et le bon sens. **[What does it mean? Scientific names and common sense.]** *Rev. for. franç.* 1950 (1), (8–16). 3 refs. [F.]

Adopts the list of botanical names approved by the Forestry Commission, adding the French vernacular names and the names of some species not included in the British list. [Cf. *For. Abstr.* 8 (No. 820).]

2584. BARKLEY, F. A. Clave descriptiva de los órdenes de la Anthophyta. **[A descriptive key to the orders of the Spermatophyta.]** *Rev. Fac. nac. Agron., Medellín* 9 (33), 1949 (27–69). [Span.] A.P.B.

12.25. Gymnosperms

2585. HAO, C. T. **Gymnospermae sinicae.** Cheng Chung Ltd., Chungking. 1st ed., 1945. pp. 138. [Chin.] Price Ch.$3.20.

In this handbook, 128 species (belonging to 28 genera in 10 families) of Gymnosperms occurring in China are described, with occasional illustrations. Geographical distribution, botanical characteristics, notes on some physical and mechanical properties of the wood, and a field key, are given for each species. They include *Keteleeria* (3 species), *Amentotaxus* (2 species), *Cunninghamia* (1 species), *Glyptostrobus* (1 species), *Fokienia* (3 species), and also several newly described species (e.g. *Pinus hwangshansis* Hsia and *Amentotaxus taiwanica* Hao) and varieties (e.g. 5 of *Ginkgo biloba* and 3 of *Pseudolarix kaempferi*). References are given after each genus. There is a species index in Roman type.

2586. MARTÍNEZ, M. Los *Abies* mexicanos. **[*Abies* in Mexico.]** *An. Inst. Biol. Univ. Méx.* 19 (1), 1948 (11–104). [Span.] C.G.B.

A taxonomic and morphological study presenting a new species, *Abies oaxacana*, and 5 new varieties.

2587. MARTÍNEZ, M. ***Picea chihuahuana*.** *An. Inst. Biol. Univ. Méx.* 19 (2), 1948 (393–405). [Span.] C.G.B.

A description of the species [cf. *For. Abstr.* 5 (21)].

2588. CÁCERES, M. R. Los caracteres anatómicos foliares de las especies de *Pinus* cultivadas en Mendoza. **[Anatomical characteristics of leaves of the *Pinus* spp. cultivated in Mendoza.]** *Rev. argent. Agron.* 16 (4), 1949 (224–33). 9 refs. [Span.] E.M.B.

Includes a key for the identification of species by means of leaf anatomy.

12.26-8. Dicotyledons

See also *For. Abstr.* 11 (No. 2614).

2589. URIBE URIBE, L. Algunas plantas interesantes de Urabá. **[Some interesting plants of Urabá.]** *Rev. Fac. nac. Agron., Medellín* 10 (34), 1949 (105–8). [Span.]

Includes brief notes on 3 Colombian timber trees—*Coumarouna panamensis*, *Anacardium excelsum* and *Bernoullia flammea*.

2590. MUKHERJI, S., **A monograph on the genus *Mangifera* L.** *Lloydia* 12 (2), 1949 (73–136). 46 refs. [Department of Botany, Calcutta University.] P.R.

Treats of 49 species, giving scientific and vernacular names, distribution, botanical and anatomical descriptio-, and economic uses, for each.

2591. SANDWITH, N. Y. **Contributions to the flora of tropical America: I. Dr. Ducke's collections of *Diospyros* in Amazonian Brazil.** *Kew Bull.* No. 4, 1949 (481–93).

Includes descriptions of 5 new tree species of *Diospyros*.

2592. CAMUS, A. Les chênes: Monographie des genres *Quercus* et *Lithocarpus*: III. Sous-genre *Euquercus* (Sections *Protobalanus* et *Erythrobalanus*) et genre *Lithobalanus*. [**The Oaks: Monograph on the genera *Quercus* and *Lithocarpus*: III. Subgenus *Euquercus* (Sections *Protobalanus* and *Erythrobalanus*) and genus *Lithocarpus*.**] Paul Chevalier, 12 Rue de Tournon, Paris VIe. 1948. pp. 165 + 325 in portfolio. [F.]

The Atlas to the final volume of this monumental monograph consists of the plates (with volume of explanatory captions) illustrating sections *Protobalanus* and *Erythrobalanus* of *Quercus*, and the genus *Lithocarpus*. Vol. 1 [subgenus *Cyclobalanops* and subgenus *Euquercus* (sections *Cerris* and *Mesobalanus*)] appeared in 1934–8, and Vol. 2 [subgenus *Euquercus* (sections *Lepidobalanus* and *Macrobalanus*)] in 1934–9. The text of Vol. 3 will appear later.

2593. VICIOSO, C. × ***Quercus montserrattii* C. Vic.** (*Q. cerrioides* × *robur*). *Collectanea botanica, Barcelona* 2 (1), 1948 (143–6). [Span.] O.B.D.

Description of a hybrid growing in Barcelona.

2594. PELLEGRIN, F. Les légumineuses du Gabon. [**The Leguminosae of Gabon.**] *Mémoires de l'Institut d'Études Centrafricaines, Brazzaville* (*A.E.F.*) No. 1, 1948. pp. 284 + 8 plates. [F.]

2595. BURKART, A. Leguminosas nuevas o críticas, III. [**New or critical Leguminosae.**] *Darwiniana, B. Aires* 9 (1), 1949 (63–96). 6 refs. [Span.] A.P.B.

A further study of S. American Leguminosae [cf. *For. Abstr.* 10 (No. 120)], with some revisions, new combinations, and an account of a new species, *Prosopis pugionata*.

2596. BURKART, A. La posición sistemática del 'chañar' y las especies del género *Geoffroea* (Leguminosae-Dalbergieae). [**The systematic position of *Geoffroea decorticans* and other species of *Geoffroea* (Leguminosae-Dalbergieae).**] *Darwiniana, B. Aires* 9 (1), 1949 (9–23). [Span.] A.P.B.

2597. MATUDA, E. Meliáceas de Chiapas. [**Meliaceae of Chiapas.**] *An. Inst. Biol. Univ. Méx.* 19 (2), 1948 (407–25). [Span.] C.G.B.

Describes the species of *Cedrela, Swietenia, Trichilia, Melia* and *Guarea* found in Chiapas, Mexico, with a new species, *T. chiapensis*.

2598. BURBRIDGE, N. T. **Key to the South Australian species of *Eucalyptus* L'Herit.** *Transactions of the Royal Society of South Australia, Adelaide* 71 (2), 1947 (137–67). 10 refs. L.S.

2599. BALL, C. R. **A review of *Salix anglorum* and *Salix petrophila*.** *Amer. Midl. Nat.* 43 (1), 1950 (224–41).

2600. KINGDON-WARD, F. **Does wild Tea exist.** *Nature, Lond.* 165 (4191), 1950 (297–9). 1 ref.

Discusses the present distribution of the 3 main races of *Camellia sinensis* and speculates on its original centre of dispersion.

2601. SCHERY, R. W. **A first record for the genus *Qualea* (Vochysiaceae) from North America (Panama).** *Ann. Mo. bot. Gdn.* 36 (3), 1949 (285–6). O.B.D.

The discovery of *Q. cymulosa*, a new species, in Panama, constitutes the first record of the genus north of South America.

12.29. Monocotyledons

2602. BAILEY, L. H., and MOORE, H. E., JR. **Palms uncertain and new.** *Gentes Herbarum, Ithaca, N.Y.* 8 (2), 1949 (91–205).

13. FOREST ZOOLOGY

See also *For. Abstr.* 11 (Nos. 2444, 2635, 2647, 2703, 2808, 2811–2, 3274, 3308–57).

2603. SCHNEIDER-ORELLI, O. Entomologisches Praktikum: Einführung in die land- und forstwirtschaftliche Insektenkunde. [**Practical entomology: an introduction to agricultural and forest entomology.**] H. R. Sauerländer & Co., Aarau. 2nd (rev.) ed., 1947. pp. 237. 48 refs. [G.] Price *Fr.* 10 [19*s.* 6*d.*]

The chapters of this textbook, the first edition of which appeared in 1945, are devoted to:—(1) An introduction to general insect morphology (18 pp.). (2) A preliminary account of the technique of preparing morphological specimens, followed by practical exercises on the morphology of common, readily recognizable insect types (62 pp.). (3) Exercises in systematic classification (41 pp.). (4) Biological exercises: details of the life history of common types (pp. 68). (5) Pest control methods (pp. 12). (6) Notes on the technique of collecting and the preservation of specimens in collections; hints on detecting common insects during excursions (16 pp.). (7) Useful literature (2 pp.). (8) Explanations of entomological terms (3 pp.). (9) An index to species mentioned (10 pp.).

The foremost aim of the book is to combine theory and practice, from the start, on the basis of the student's own observations. There are 117 line drawings.

2604. NUNBERG, M. Wpływ składu drzewostanu na faunę chrząszczy z rodziny biegaczowatych (Carabidae, Col.). **[The influence of the composition of the forests on the fauna of beetles of the family Carabidae (Col.).]** *Rozpr. Spraw. Inst. Bad. Leśn.* No. 58, 1949. pp. 32. [Pol.russ.e.]

Describes experiments in beetle-trapping made in the Miechów forest about 43 km. north of Cracow. The composition of the forests had a marked influence on the carabid population. The existence of greater numbers of predaceous Carabidae in the mixed forests is one of the reasons for the latter's greater resistance to insect pests.

2605. GYÖRFI, J. Sopron környékének futrinka-féléi. **[Ground beetles of the Sopron neighbourhood.]** *Erdész. Kisérl.* 47, 1947 (133–63). [Hu.g.]

Lists and describes 281 species of Carabidae.

2606. BELYEA, R. M. **Seasonal history notes on the black sawyer beetle** [*Monochamus scutellatus*]. *Bi-m. Progr. Rep. For. Insect. Invest. Dep. Agric. Can.* 5 (6), 1949 (1).

2607. [CHRYSTAL, R. N.] **The Alder woodwasp *Xiphydria camelus* L.** *Rep. Imp. For. Inst., Oxf. 1948–9*, 1950 (16).

Two new parasites of this species have been discovered, viz. *Aulacus striatus* and another, at first believed to be a species of *Pteromalus* but now thought to belong to a new genus.

2608. SNYDER, T. E. **Catalog of the termites (Isoptera) of the world.** *Publ. Smithson. Inst.* No. 3953, 1949. pp. 490. 32 pages of refs. [Bureau of Entomology and Plant Quarantine, U.S. Department of Agriculture.] P.R.

2609. POTOČKA, J. Několik předběžných údajů o obaleči *Epiblema proximana* H.S. **[Some notes on the ecology of a tortricid, *Epiblema proximana* H.S.]** *Acta Societatis Entomologicae Čechosloveniae, Prague* 45 (1/2), 1948 (89–94). [Cz.f.] I.I.E.

The egg and caterpillar are described, and a key is given to distinguish the latter from the caterpillars of *E. tedella* and *Argyroploce hercyniana*, which it closely resembles in appearance. The caterpillars of both species of *Epiblema* feed on Silver Fir needles and form cocoons on them, but *proximana* proceeds from the tip towards the base of a needle, and *tedella* in the opposite direction. The former pupate at least a fortnight earlier.

2. SILVICULTURE

2610. POSKIN, A. Traité de sylviculture. **[Treatise on forestry [with particular reference to conditions in Belgium].]** Jules Duculot, Gembloux. 3rd ed. (revised) 1949. pp. 530. Many réfs. Price [£2. 3*s*. 0*d*.].

2611. ISAAC, L. A. **Recent development in silvicultural practices in the Douglas-Fir region.** *J. For.* 47 (12), 1949 (957–60).

2612. FOURY, P. Principes de sylviculture tropicale. **[Principles of tropical forestry.]** *Bois For. Trop.* Nos. 5, 1948 (19–26); 10; 11, 1949 (133–46; 269–76). [F.]

2613. ANDRADA, E. DE CAMPOS. Contribuição para o estudo de valorização florestal de Angola. Sobre a necessidade de metodizar a exploração de lenhas na província de Benguela.

[Contribution to the study of forest management in Angola. The need for rationalizing the exploitation of fuel in Benguela province.] *Publ. Serv. flor. aquic. Portugal* 10 (1), 1943 (5–19 + 6 plates). [Port.e.]

A short study of vegetation types along the transcontinental Benguela Railway in Angola, with recommendations for conservation practices. East of the Cuanza, rational management of the forests should favour adequate regeneration since they are too dense to allow undergrowth and there is no great danger of fire. West of the Cuanza, however, when the forests are opened up, the clay soils and climatic conditions favour the formation of savannah. These conditions, where they already exist, are aggravated by the nomadic habits of the population. In the forests owned by the Benguela Railway Co. no clear fellings are permitted, but a system which maintains an uninterrnpted soil cover is followed. Afforestation of large tracts with exotic species (mainly Eucalypts) has been in progress since 1931. *Eucalyptus rostrata* has been found fairly resistant to termites and quite adaptable to the laterite soils.

2614. ELORRIETA Y ARTAZA, J. El castaño en España. **[Chestnut in Spain.]** [*Bol.*] *Inst. for. Invest. Exp. Madrid* 20 (48), 1948. pp. 314 + 16 plates + 2 maps + 1 tbl. Numerous refs. [Span.span.f.e.g.]

A comprehensive study of *Castanea sativa* in Spain. The following aspects are dealt with in some detail: (1) Botanical studies—including ecology of its habitat in Spain, area of distribution, and descriptions of the most important varieties of the Galician and Basque provinces. (2) Silviculture—management as high forest and coppice, artificial regeneration methods, and nursery practice. (3) Cultivation for production of nuts. (4) The uses of the timber and its properties, with special mention of the cooperage and packing-case industry. (5) Pathology, with particular reference to ink disease, *Phytophthora cambivora*, and Chestnut canker, *Endothia parasitica*, including the raising and establishment of disease-resistant varieties. Considerable success has been obtained with crosses of *C. mollissima* and *C. crenata*.

2615. VINCENT, G. Pěstění topolů v rámci plánované zvýšené dřevní produkce. **[Poplar growing [in Czechoslovakia] in connexion with the planned raising of timber production.]** *Věstn. čsl. Akad. zeměd.* 22 (3/4), 1948 (172–7). [Cz.] C.G.B.

Considers briefly and in general terms the need for increased timber production and the possible rôle of fast growing species, e.g. especially Poplars, in meeting this need. Reviews the chief climatic zones of the country and the site types where Poplar growing should succeed, making the following recommendations on choice of species for Bohemia and Moravia:—I. Lowlands: (*a*) Valleys of lower Morava, Dyje and Svratka: (1) Permanently wet sites—*P. nigra*; (2) floodplain soils—*P. serotina*, *P. marilandica*, *P. regenerata*, *P. deltoides* vars. *missouriensis* and *monilifera*, *P. nigra*, *P. robusta*, *P. vernirubens*, *P. bachelierii*, *P. canescens*, *P. alba*, *P. eugenei*; (3) gravel terraces—*P. tremula*, *P. alba*, *P. canescens*, *P. deltoides* var. *monilifera*; (4) low hills—*P. serotina*, *P. deltoides* var. *monilifera*, *P. nigra*, *P. tremula*, (*b*) Bohemian plain: essentially similar recommendations. (*c*) Upper Morava valley: (1) permanently wet sites: *P. nigra*; (2) floodplain soils—*P. serotina*, *P. regenerata*, *P. deltoides* var. *monilifera*, *P. nigra*, *P. canescens*; (3) Gravel terraces—*P. tremula* and possibly *P. canescens*; (4) low hills—*P. tremula*. II. Hill country: (*a*) River valleys—*P. serotina*, *P. nigra*, *P. deltoides* var. *monilifera*, *P. tremula*; (*b*) Protected sites under 400 m. altitude—*P. tremula*; (*c*) Exposed sites and sites above 400 m.—*P. tremula* as an auxiliary species only.

Very brief notes are also included on soil requirements, propagation, and tree-breeding possibilities of Poplars.

2616. GŁYDA, K. O topoli i jej rozmnażaniu. **[Poplars and their propagation.]** *Wydaw. pomocn. tech.-gosp. Inst. Bad. Leśn.* No. 17, 1948. pp. 84. 15 refs. [Pol.]

The bulletin contains descriptions of and a key to the Poplars most widely cultivated within the West European climatic region; of these varieties only those which have an economic value as forest trees are taken into account. The silvicultural characteristics of Poplars, methods of propagation (vegetative and by seed), planting and tending, and diseases and pests, are also dealt with.

2617. POURTET, J. Détermination et utilisation des peupliers noirs cultivés en France.

[Identification and use of the Black Poplars grown in France.] *Rev. for. franç.* 1950 (2), (53–65 + 5 photos). [F.]

Includes a key for identification, notes on silvicultural characters and uses, and recommendations for choice of species for different part of France.

2618. HERBIGNAT, A. Considérations géné-. rales sur le peuplier. Types à cultiver en Belgique. Contrôle variétal. Rappel de quelques principes fondamentaux de sa culture **[General considerations on the Poplar. Types to cultivate in Belgium. Varietal control. Reminder of some fundamental principles of its cultivation.]** *Bull. Soc. for. Belg.* 57 (1), 1950 (1–32 + tbl. + 28 photos). 36 refs. [F.]

21. SILVICULTURAL CHARACTERS OF TREE SPECIES

See also *For. Abstr.* 11 (Nos. 2491–2, 2494, 2552, 2652, 3244).

21.0 *Adaptability to the General Environment. Acclimatization*

2619. COTTA, A. Sulla rinnovazione naturale. **[Natural regeneration [of exotic species in Piemonte, Italy].]** *Schweiz. Z. Forstw.* 101 (2/3), 1950 (104–11). [It.G.]

A number of exotic species were planted, about 150 years ago, in the park surrounding a castle in Monferrato. These included Larch, Scots Pine, Spruce, *Abies pinsapo*, Corsican Pine, 3 species of Cedar, 2 of *Chamaecyparis*, *Thuja*, *Tsuga*, *Juniperus virginiana*, *Ginkgo*, *Acer negundo*, Horse Chestnut, *Ailanthus*, *Melia azedarach*, and *Robinia*. With the exception of the Larch (which stagnated) and the Scots Pine (chlorotic) all these species have grown well, but only the Horse Chestnut and Robinia appear to be reproducing themselves in any appreciable degree.

2620. MARINUCCI, M. L'olivo nelle più recenti acquisizioni sulla sua biologia e coltivazione. **[The Olive—recent advances in knowledge of its biology and cultivation.]** *Ital. agric.* 86 (10), 1949 (571–87). 42 refs. [It.] E.M.B.

2621. SCHULENBURG, A. FR. VON DER. Erfarenheter vid acklimatisering av en nordamerikansk massavedstall i Europa. **[Experience in the acclimatization of a N. American pulpwood Pine in Europe.]** *Svenska SkogsvFören. Tidskr.* 46 (6), 1948 (382–92). 10 refs. [Sw.]

Measurements of sample plots of Murray Pine [*Pinus contorta* var. *latifolia*] at Mustila in 1943 showed that here, on a clay site, the total yield was 320 cu.m./ha. at 33 years of age, or about 50% more than for Scots Pine and 100% more than for Norway Spruce on the same site. Heavily thinned and unthinned plots showed an almost identical total yield and very similar height and diameter growth. The tallest trees on both plots exceeded 17 m., and the mean breast-height diameters of the thinned and unthinned plots were respectively 11·7 and 11·8 cm. It is emphasized that Murray Pine does best on moist clays and humous sands, also on moraine soils if not too dry; on acid swamps and dry sites it will not do well. It has shown exceptional ability to compete with grass and weeds, even *Calamagrostis*, and appears to be free from the usual diseases of young conifers, e.g. *Lophodermium pinastri*. Some sawfly attack (by *Lophyrus rufus*) has been observed, but even completely defoliated trees recovered. It can be planted, as 3- or strong 2-year-old stock, either pure or in mixture, e.g. with Norway Spruce or Alders (*A. glutinosa* and *A. incana*), to be removed as thinnings when the Murray Pine is capable of forming the main stand alone. For pulpwood, however, it would probably be best to form large-scale pure plantations, especially in areas where the native conifers are to be avoided—e.g. where Spruce suffers from rot and forms raw humus, and where Scots Pine develops black knots. For pulpwood a rotation of *ca.* 40 years should be suitable. [Cf. *For. Abstr.* 10 (No. 2238).]

2622. DELEVOY, G. Le pin noir d'Autriche en Belgique. **[*Pinus nigra* var. *austriaca* in Belgium.]** *Schweiz. Z. Forstw.* 100 (12), 1949 (525–37). [F.g.]

Includes sample-plot data on increment and yield, and discusses silvicultural requirements. [Cf. *For. Abstr.* 11 (No. 2539).]

2623. GIPERBOREJSKI, B. ***Pistacia vera* L.** *Šum. List* 72 (8), 1948 (277–8). [Croat.]

A description of the species, its characteristics and uses, with recommendations for introducing

it into Jugoslavia in the light of experience elsewhere. Its success in the subtropical, dry regions of Turkmenistan, and at lower elevations in Italy, Palestine and the Ukraine are cited and a method of sowing tried in Afghanistan in 1930 is described in detail, as pertinent to Jugoslav conditions. Seed was stratified and sown in spring, 5–10 together, at 1-m. intervals in furrows 25–60 cm. wide and 10–15 cm. deep; in small pockets, also with seeds 5–10 together; and, on plateaux, in cup-shaped shallow pits. Success was 88%, with 33% normal healthy plants, and although less sturdy than nursery transplants, the seedlings averaged 6–12 cm. in height [after 1 year?], with little difference between methods used but better results for the lower elevations. On the karst land of Jugoslavia the author considers some watering would be necessary in the early stages; the ground to be prepared in advance, at the onset of winter, the seed stratified in dry sand and moistened just before sowing in February. He also points out that the two species of *Pistacia*, *P. terebinthus* and *P. lentiscus*, found in Dalmatia could be used for grafting *P. vera*. The Director of the Botanical Gardens in Ashkhabad recently presented the Jugoslav authorities with a quantity of *P. vera* seed, along with full instructions on its culture. First trials with this seed were made last spring on the karst land of Dalmatia.

2624. Acosta Solis, M. Algunas consideraciones ecológicas sobre la introducción y aclimatación de especies forestales exóticas a los países andinas. [**Some ecological considerations on the introduction and acclimatization of exotic forest species in the Andean countries.**] *Publicación del Departamento Forestal del Ecuador* No. 4, 1949. pp. 8. [Span.]

Discusses the influence of climatic conditions, particularly that of temperature, on the survival of species introduced into the Andean regions of Ecuador, and the importance of taking into account differences in atmospheric pressure. Species for reforestation should be sought first among native trees, and then among those from mountainous zones of equatorial countries.

2625. Hellinga, G. Resultaten van de proeftuinen voor boomgewassen sedert 1937—coniferen. [**Results from experimental plantations of [exotic] conifers since 1937.**] *Rapp. Bosbouwproefsta. Buitenzorg* No. 23, 1949. pp. 12. [Du.e.]

A report, showing in tables the height, diameter growth, basal area, and general condition of plantations of *Dacrydium beccarii*, *Podocarpus* spp., *Agathis* spp., *Chamaecyparis obtusa*, *Cryptomeria japonica*, *Cunninghamia lanceolata*, *Cupressus* spp., *Pinus* spp., *Sequoia sempervirens* and *Widdringtonia whytei*, covering in all some 30 species. The provenance of each is given.

21.8. *Phenology*

See also *For. Abstr.* 11 (Nos. 3186–7).

2626. Hemming, E. S. **Shedding of evergreen leaves.** *Amer. Nurserym.* 90 (12), 1949 (28–9).

Notes on the varying periodicity of a number of coniferous and broadleaved species.

22. SILVICULTURAL SYSTEMS. FORMS OF STAND

2627. Burgers, T. F. La regeneración natural y la mezcla de especies como ideal en la selvicultura. [**Natural regeneration and mixed stands as a silvicultural ideal.**] *Montes, Madrid* 5 (30), 1949 (505–8). [Span.]
A brief summary of the silvicultural systems used in southern Germany.

22.1. *High Forest Forms*

See also *For. Abstr.* 11 (Nos. 2634, 2640–1, 3419).

2628. Ximenez de Embun, J. El encinar en monte alto. [*Quercus ilex* **as high forest.**] *Hoja divulgadora, Servicio de Capacitación y Propaganda, Ministerio de Agricultura, Madrid* Spec. No., 1948. pp. 16. 7 refs. [Span.]

Discusses the management of *Quercus ilex* as high forest and makes recommendations on felling cycles, rotation, and methods of treatment, including cleanings and prunings.

2629. Tyszkiewicz, S. Nasiennictwo i szkółkarstwo w okresie przebudowy gospodarstwa leśnego. [**The seed and nursery problem during the change-over to the selection system.**] *Wydaw. pomocn. tech.-gosp. Inst. Bad. Leśn.* No. 22, 1949. pp. 28. [Pol.]

The author discusses the demands for seed, seedlings and nursery space consequent on the

change-over to the selection system [cf. *For. Abstr.* 10 (p. 441), 11 (No. 1742)], and the supply organization involved. The data are tabulated by species, including the quantities of seed required for 5 years' work.

2630. WALLMO, T. Blädningsbruk i ett halvt sekel. **[Selection forestry for half a century [at Högsjö].]** *Svenska Skogsv-Fören. Tidskr.* 46 (5), 1948 (331–40). [Sw.]

Gives the main results of the latest (1947) of the strip surveys, covering 5% of the area, which have been made at 10-year intervals ever since the author's father, Uno Wallmo, was responsible in 1897 for the introduction of selection treatment on this forest estate. Over these 50 years the forest has been gradually modified in the direction of selection forest, but it will take several generations yet for the selection-forest structure to be fully attained. The results so far are regarded as very favourable. Particular stress is laid on the distribution of the bulk of the increment to large, valuable stems, and on the finding that the breadth of annual rings shows a continued increase from the 33-cm. class and upwards for all size classes, i.e. the largest and most valuable trees have the broadest rings—a result of the fact that under selection treatment the young trees receive a minimum of light, but this is gradually increased to an optimum as the tree passes into the higher diameter classes.

2631. WECK, J. Gestaltung von Bestandesgefüge und Bestandesmischung als Grundlage zum Aufbau eines Dauer-Hochleistungswaldes. **[Stand structure and stand composition as foundations for the creation of a productive, permanent forest.]** *Schweiz. Z. Forstw.* 100 (10/11), 1949 (486–501). 18 refs. [G.f.]

The author attacks the tendency in some recent German writers, notably Wittich [cf. *For. Abstr.* 11 (No. 2652)], to desert the principle of mixed uneven-aged selection forest, and revert to the conception of pure even-aged coniferous stands, trusting to soil cultivation and liming to keep the soil in good condition. Weck recapitulates the development of the conception of Dauerwald and its application in the 19th century, and examines the admitted difficulty of establishing and maintaining mixed uneven-aged forest in North Germany [Cf. *For. Abstr.* 9 (No. 827).]

22.2. *Coppice Forest*

2632. SCHAEFFER, L. Le pour et le contre dans les conversions. **[The pros and cons of conversion.]** *Rev. for. franç.* No. 9/10, 1949 (413–20). 11 refs. [F.]

Reviews the arguments for and against the conversion of coppice-with-standards to high forest.

2633. NATIVIDADE, J. VIEIRA, and SANTOS, J. BRITO DOS. Exploração do sobreiro em talhadia. **[Exploitation of Cork Oak by the coppice system.]** *Publ. Serv. flor. aquic. Portugal* 10 (1), 1943 (225–33 + 1 plate). 6 refs. [Port.e.]

Suggests that the exploitation of Cork Oak [*Quercus suber*] by a system of coppicing might offer advantages to the small proprietor, for the simultaneous production of virgin cork, tanbark and firewood or charcoal. Figures show production of these items from 55 to 60-year-old stools, in Portugal, which had been cut back every 12–15 years.

22.8. *Forms of Stand*

See also *For. Abstr.* 11 (Nos. 2652, 3330, 3359).

2634. MIEGROET, M. VAN. Étude de la composition de quelques peuplements de pins autochtones en Suisse. **[Study of the composition of some indigenous Pine stands in Switzerland.]** *Schweiz. Z. Forstw.* 101 (1), 1950 (1–27). [F.g.]

The author made a detailed study of sample plots of natural *Pinus sylvestris* on 7 different sites, giving particular attention to associated species. Profiles and crown plans of each are given. It is concluded that the best results are obtained where Pine is mixed with broad-leaved species. Those best suited to form the understorey are light-demanding species capable of tolerating a high, light canopy. Where Pine is growing on *Querceto-Carpinetum* sites, Oak should be preferred to Hornbeam or Lime. Shade-bearing species such as Beech and, to some extent, Spruce, are not very suitable as auxiliary species with Pine; though they stimulate its height growth, they do not have a beneficial effect on its crown formation and development. They also make regeneration of the Pine difficult. It was observed that Pine regenerates most easily when a system of group-regeneration fellings is employed. Clear

felling should be avoided at all costs, and strip felling used only where it is absolutely necessary. The uniform system favours the auxiliary species at the expense of the young Pine regeneration. In two forests where an attempt has been made to manage Pine on a true selection system, the malign influence of shade-tolerant species on Pine regeneration was evident. On the other hand, light, high shade appears not to harm Pine in its youth, and in fact improves the quality of its wood by preventing over-rapid growth.

2635. KAPUŚCIŃSKI, S. Rola jarzębiny (*Sorbus aucuparia* L.) w biocenozie leśnej. **[The rôle of *Sorbus aucuparia* in the forest biocoenosis.]** *Ulotk. Wydaw. pop. Inst. Bad. Leśn.* No. 16, 1945. pp. 10. [Pol.]

The writer sees the rôle of *Sorbus aucuparia* as a useful admixture to pure Scots Pine stands. It serves as host for certain insects which during their larval stage are hosts for parasites that keep down the insects attacking the Pine. The leaflet contains a list and drawings of the chief insects on *S. aucuparia* that perform this function.

2636. WILHELMY, H. Bestandsaufbau und Wirtschaftswert des Urwaldes am Alto Paraná. **[Composition and economic value of the virgin forests of the Alto Paraná region.]** *Z. Weltforstwirt.* 13 (4/6), 1949 (61–7). 15 refs. [G.e.f.]

23. FORMATION OF STANDS

2637. POINSIER, J.-L. Sur la possibilité de culture et la germination du parasolier. **[The possibility of cultivating, and the germination of, *Musanga smithii*.]** *C.R. Acad. Agric. France* 33 (11), 1947 (431–5). [F.] I.I.E.

M. smithii regenerates readily in the forests of the Ivory Coast on open tracts, river banks, or cleared and abandoned land. The densest stands are found on fresh siliceous clays, where the light is diffused, and the soil contains decomposing organic matter. Seed is abundant, is much favoured by birds, and retains its viability for a considerable time. In germination tests, seeds were soaked in solutions of H_2SO_4 or HCl, but the results were disappointing. The weaker the solution and the longer the soaking period, the better were the results. Turgescent seed, however, sown in cleared ground in secondary forest, gave good results. Further successful germination tests were made at the Muséum National d'Histoire Naturelle. [Cf. *For. Abstr.* 9 (No. 2167).]

23.1. *Natural Regeneration*

See also *For. Abstr.* 11 (No. 2577, 2619, 2634, 2659–60, 3313–5, 3358, 3364).

2638. **[Methods of obtaining regeneration in the dry upper mixed deciduous forest in Upper Burma.]** *Rep. Wkg. Plans Silv. Ent. For. Dep. Burma 1946–7*, 1949 (25–8).

Describes a method by which the canopy was opened gradually by the felling of Bamboo or useless species, the opening being so regulated that seedlings could come up but weed invasion was avoided. Fire was excluded from these areas. Slowness was of the essence of the method. Fellings were made at intervals of 2–3 years and from the time the areas were first entered it was some 12 years before they were considered to be fully regenerated and the felling of the main crop could be allowed. Results were better than those obtained by other methods, e.g. the 'irregular taungya' which has often been adopted on account of its cheapness. In 12–15 years two compartments (*ca.* 800 acres) were regenerated, and when the final felling was made in 1938, the mature crop consisted almost entirely of useful species, and beneath was a stand of almost plantation density containing a preponderance of such species.

2639. AUER, C. Untersuchungen über Dürreresistenz und Wachstum von Lärchenkeimlingen auf verschiedenen Horizonten des Eisenpodsols subalpiner Arven-Lärchenwaldungen. **[Investigations into the drought resistance and growth of Larch seedlings on different horizons of an iron podzol of sub-alpine *Pinus cembra*/*Larix decidua* forests.]** *Vegetatio* 1 (2/3), 1948 (1949) (79–22 + 2 plates). 3 refs. [G.f.] A.P.B.

The tests were made with *L. decidua* raised on soils from different horizons of an iron podzol of the sub-alpine *Rhodoreto-Vaccinietum* of the Upper Engadin, and were part of an investigation into reasons for the regression of Larch in this region. The different soils had

no effect on germination %. Raw humus, however, dries more quickly than mineral soils under similar natural conditions, and, therefore, the danger of drought to Larch seedlings is far greater in humus than in the mineral soils. The B horizon is most favourable to germination of Larch. Soil treatments which expose only the A horizon are therefore not sufficient to ensure regeneration. The B horizon must be exposed before sowings are made.

2640. Reynolds, R. R. **Side lights on managing mixed Pine-hardwood stands under the selection system.** *J. For.* 48 (2), 1950 (108–11).

The author has for 12 years applied selection methods to the management of 1,000 acres of understocked second-growth stands of mixed *Pinus echinata*/*P. taeda*/southern hardwoods in the Crossett Experimental Forest, Arkansas. Before cutting began in 1938 the stand had a volume of 3,685 bd. ft./acre. Selection cuttings during the 10-year period removed 1,676 bd. ft./acre, yet the compartment ended the period with 5,600 bd. ft./acre. A necessary part of the procedure is the girdling or poisoning of undesirable hardwoods to favour Pine regeneration. This may cost $2–$4 an acre, but the increased growth of Pine will usually more than repay this in 10 years.

2641. Pomeroy, K. B., and Barron, N. T. **Hardwoods vs. Loblolly Pines.** *J. For.* 48 (2), 1950 (112–3). 3 refs.

Reviews the methods at present being tested in the south-eastern U.S.A. to check the invasion of Pine stands by hardwoods, which is favoured by ordinary clear felling. These include burning and scarification to produce a favourable seedbed, and release of Pine seedlings by girdling or poisoning the hardwoods.

2642. Little, S., and Soames, H. A. **Slash disposal in Oak-Pine stands of southern New Jersey.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 31, 1949. pp. 12. 7 refs.

In many areas slash does not greatly damage established Pine reproduction and on the other hand may protect seedlings from browsing deer. The effect of slash on the establishment of additional reproduction varies, and so too should methods of slash disposal. Where the forest floor is already unfavourable for the establishment of Pine seedlings, the addition of slash will further decrease the rate of establishment; but where the seedbed is mostly mineral soil, slash generally has little effect. Hence, slash disposal is generally not necessary on areas that have been burnt before logging, but is advisable on unburnt areas. The most satisfactory and cheapest way of dealing with the slash problem is the periodic use of prescribed burns before harvest cuttings. These light fires are used in the management of Oak/Pine forests in southern New Jersey to protect the stands against destructive wild fires, to create favourable seedbeds for Pine, and to repress unwanted hardwood reproduction. *From authors' summary.*

2643. Bruce, D., and Bickford, C. A. **Use of fire in natural regeneration of Longleaf Pine.** *J. For.* 48 (2), 1950 (114–7).

Cf. *For. Abstr.* 11 (No. 227).

2644. Gray, D. W. **Reproduction following the cutting of a pure Jack Pine stand.** *Pulp Paper Mag. Can.* 51 (1), 1950 (104, 106, 108). [K.V.P. Co. Ltd.]

Describes experiments since 1948 to find methods, applicable on a commercial scale, and likely to ensure adequate natural regeneration of Jack Pine [*Pinus banksiana*] under clear felling. Indications to date are that: (1) spring burning does not sufficiently reduce the humus layer but materially reduces the amount of viable seed; (2) scarification with an Athens plough effectively exposes the mineral soil on only 2–3% of the total area, whereas tractor skidding does so on *ca.* 25%; but, with both, supplementary artificial sowing was necessary; (3) cable skidding is a relatively ineffective scarifier, but seed supply is well distributed. [Cf. *For. Abstr.* 10 (No. 990).]

2645. Le Pont, P. Un ancien appareil de crochetage. **[An old-fashioned implement for scarifying [the soil of Beechwoods].]** *Rev. for. franç.* No. 9/10, 1949 (421–5). [F.]

Describes a small horse-drawn scarifier formerly used in the state forest of Eawy, to prepare the ground of Beechwoods in mast years.

2646. Silvy-Leligois, P. Les problèmes de la régénération dans les hêtraies normandes. **[Problems of regeneration in Norman Beech woods.]** *Rev. for. franç.* No. 9/10, 1949 (426–34). 13 refs. [F.]

The author first describes the successful methods used in the 19th century to obtain

regeneration in the Beech woods of the Forest of Eawy. These comprised successive regeneration fellings, scarification of the soil in mast years [cf. preceding abstract] and filling gaps in the natural regeneration after the final felling, either by planting or by direct sowing. Several causes led to the abandonment of this system, e.g. the general adoption of clear felling instead of progressive regeneration fellings, and the increasing scarcity and cost of labour. The peculiar difficulties of Beech regeneration and possible ill effects of this species on the soil are discussed with reference to the literature, and the need for returning to earlier methods is urged.

2647. ANDERSON, M. L. **Avificial woods arising from the dissemination of seed by birds.** *Sylva, Edinb.* No. 30, 1949–50 (9–12 + 1 photo). 7 refs.

Reviews the scanty literary references to the dissemination of heavy-seeded tree species by birds, and describes several Oak woods or mixtures of Oak with other species, which appear to have originated in this way.

2648. PUTNAM, J. A., and MCKNIGHT, J. S. **Depleted bottom-land hardwoods make quick come-back.** *Sth. Lumberm.* 179 (2249), 1949 (143–6).

Presents data on the growth and development of a tract in the Delta Experimental Forest, Stoneville, Miss., which was clear felled during the first World War, and left open to degradation and fire for about 20 years before being protected. The data are considered important because the area is typical of much of the bottomland forests of the South, and they indicate that, under proper management, the stand will return to full productivity within a reasonable time.

2649. VLYMEN, V. P. VAN. **Aspen grove type (1921 burn) Iroquois Falls, Ontario.** *Pulp Paper Mag. Can.* 50 (12), 1949 (130, 132, 134).

Presents data gathered from an aerial survey, plus ground sampling, of Aspen stands which originated after an extensive, severe fire in 1921. It should be possible to start cutting selected areas for pulpwood in 10 years and a 50-year rotation is indicated.

2650. **[Natural regeneration of Cedar [*Cedrela mexicana*] in British Honduras.]** *Rep. For. Dep. Brit. Hond. 1948*, [1949?] (3).

Natural regeneration of Cedar [*Cedrela mexicana*] has appeared in abundance over the limestone country that was burned over in 1945. The Cedar trees, being fire-resistant, were not always killed, and the lightening of the forest canopy by the death of many of the trees and palms has provided an opportunity for Cedar seedlings to invade forest with a canopy normally too heavy for Cedar to survive under it.

23.2. *Artificial Regeneration*

2651. LENZ, A. Die österreichische Schwarzkiefer und ihre Verjüngung. **[*Pinus nigra* var. *austriaca* and its regeneration.]** *Landwirtschaft, Vienna* No. 11/12, 1948 (166–7). [G.] A.P.B.

Artificial regeneration of this species in Austria is considered advisable; recommendations are made for sowing and planting.

23.21. Choice of Species

See also *For. Abstr.* 11 (Nos. 2491, 2561, 3393–6).

2652. WITTICH, W. Die heutigen Grundlagen der Holzartenwahl dargestellt am Beispiel des nordwestdeutschen Waldgebietes. **[The present-day bases of the choice of species, using the N.W. German forest region as an example.]** M. & H. Schaper, Hannover. 1947. pp. 63. 9 refs. [G.]

This booklet is written from the point of view that attempts to create or restore favourable soil conditions solely by manipulating stand composition, cannot be justified if the same end can be achieved more economically by purely technical measures, e.g. liming. The author reviews the effects of tree species on the soil through effects on microclimate, litter, ground vegetation, and root activity, with special sections on the effects of mixtures of species and the influence of species on the formation of true humus substances. He then considers how far choice of species, as a means of influencing soil conditions, can be replaced or supplemented by other measures enabling a better economic result to be obtained. Practical conclusions are set forth in a final chapter, with special sections on the use of fast growing species such as Douglas Fir and Poplars, and on the general conditions for the choice of species in the diluvial region of N.W. Germany

and in the mountain areas of Hanover. The main conclusion is that there are many sites in the region which are capable of growing higher-yielding forest crops without detriment, and often with much benefit, to the soil, provided that liming is done. It is noted that the influence of liming is of long duration, since the CaO is returned in the litter. On some sites, e.g. pronounced podzols with iron pan, it will often be advantageous to deep-plough and turn the land over to agricultural crops and legumes before regeneration. Technical measures such as these are capable of restoring soil fertility more quickly, especially on the poorest sites, than is possible by using 'soil-improving' tree species, but these methods are, naturally, not mutually exclusive. [Cf. *For. Abstr.* 11 (No. 2631).]

23.22. Preparatory Work. Auxiliary Measures

See also *For. Abstr.* 11 (No. 2566).

2653. **Plantation establishment.** *Rep. For. Timb. Bur. Aust. 1948*, 1949 (15).

The beneficial effect of planting *Pinus radiata* on ploughed strips rather than in dug holes was marked. *P. radiata* growing on an area that had been cultivated 8 times, though at somewhat irregular intervals, over a period of 5 years from planting, had an average height of 12 ft. 2 in. while trees on uncultivated ground averaged only 9 ft. 7 in. in the same time.

2654. VESTERINEN, E. Das Abbrennen von Hiebsflächen in Finnland. **[Burning of felling areas in Finland.]** *Schweiz. Z. Forstw.* 101 (1), 1950 (51–4). [G.]

Describes a method of regeneration by burning the felling area (preferably in May–June, but also in July or August if the weather is dry) and then sowing broadcast. Not more than 2 ha. should be burnt at a time. The fire is confined to that area by a safety belt consisting of a cleared zone, 5 m. wide, all round, with a ditch 60 cm. wide on its outer edge. Burning should be done up-wind, preferably on a sunny afternoon when the wind is not too strong.

23.23. Seed and Sowings

See also *For. Abstr.* 11 (Nos. 3314–5, 3349).

2655. **Woody-plant seed manual.** *Misc. Publ. U.S. Dep. Agric.* No. 654, 1948. pp. 416. 57 + 369 refs. Price $2.75.

Prepared by the U.S. Forest Service. Part 1 (52 pp.) consists of chapters on the development, production, dispersal, source, collection, extraction, storage, treatment, and testing of seed. Part 2 gives detailed information for 444 species and varieties for which reliable data were available, under the following heads:—(1) nomenclature; (2) growth habit, range, uses, and how long in cultivation; (3) kind and time of flowering, fruit ripening, seed dispersal, description of seed, and occurrence of climatic races; (4) time and methods of collection, extraction and cleaning, yield of cleaned seed per bushel or 100 lb. of fresh fruits, number of cleaned seed per lb., purity, cost, and soundness of commercial seed (as at 1940), and effectiveness of known storage methods; (5) time, place, and type of natural germination, kind of dormancy and methods of overcoming it, necessary conditions of germination tests, germinative energy and capacity; (6) time, method, density and rate of sowing, and nursery practice generally. The information is presented by genera arranged alphabetically.

2656. TYSZKIEWICZ, S. Nasiennictwo leśne. **[Forest seed.]** *Podręczn. Inst. Bad. Leśn.* No. 2, 1949. pp. vii + 358 + 1 drawing, 1 tbl. 164 refs. [Pol.]

This book, by the Chief of the Polish Forestry Institute's Seed Testing Branch, has chapters on the following:—(1) Plant reproduction. Structure and development of tree seed. (2) Natural factors influencing seed quality. (3) Racial characteristics of the more important forest trees. (4) Choice of stands for seed production. (5) Seed production of trees and stands. (6) Seed collection. (7) Storage of seed and fruits. (8) Seed extraction. (9) Testing and classification of seed. (10) Review of the more important forest trees and shrubs; their seed collection and treatment.

Problems of provenance are treated at length in chapters 2 and 3 (pp. 8–46), the results of research into racial characteristics being discussed individually for 16 important European species. In chapter 7, methods of acorn storage are given in special detail (10 pp.). In chapter 9, which takes into account all modern methods of seed testing, the author introduces the criterion of 'mean germination time', as well as germination capacity and energy, i.e. the mean period between the start of the germination test and the first germination. He also sets up certain standards of

quality for the various species, against which individual batches of seed can be compared. In chapter 10 he discusses 74 species individually, including the important central and eastern European tree and shrub species, and a few American hardwoods and conifers.

The book contains about 200 tables and illustrations, a glossary of tree seed terms and some 160 references, largely Polish, Russian, Czech and German. [Cf. *For. Abstr.* 11 (No. 1768).]

23.23.1. *Seed Procurement, Treatment, and Testing*

See also *For. Abstr.* 11 (Nos. 2532, 2536–9, 2629).

2657. MESSER, H. [Edited by ROHMEDER, E.]. Die Waldsamenernte. **[The harvesting of forest seed.]** M. & H. Schaper, Hannover. 1948. pp. 64. 11 refs. [G.]

A practical booklet with sections on: preparatory measures (seed-crop estimation, labour questions); harvesting proper (general notes, followed by details for all the species commonly grown in Germany, arranged alphabetically by species); seed transport; and the storage of seed over winter.

2658. THIRINGER, J. Fenyömagvaink gyüjtése, vizsgálata és vetésre való elökészítése. **[Collection, testing and preparation for sowing, of conifer seed.]** *Erdész. Lap.* 85 (4), 1949 (78–83). [Hu.e.f.g.]

Based partly on the author's experience and dealing chiefly with *Pinus sylvestris*.

2659. HEIKINHEIMO, O. Metsäpuiden siementämiskyvystä. III. **[On the seed-bearing capacity of forest trees. III.]** *Commun. Inst. for. Fenn.* 35 (3), 1948 (1949). pp. 15. [Fi.e.]

Gives a summary account of observations made during the years 1937–46 on the seed crops of a number of experimental plots in seed-tree stands of Pine, Spruce and Larch; earlier publications by the same author gave similar data for the years 1927–36. In spite of the scarcity of regular Spruce seed years, the total Spruce seed crops over a long period are much more abundant than those of Pine. At one station in the course of 20 years the total Pine seed crop amounted to 15 kg./ha. as against 36 kg./ha. for Spruce, corresponding to about 0·75 and 1·82 kg. per year respectively. The total crop in a mixed forest of Pine and Spruce, in which Pine was the dominant species, was *ca.* 32 kg., of which *ca.* 20 kg. were Spruce and *ca.* 12 kg. Pine. In most cases the quality of seed, for Larch as well as for Pine and Spruce, was best in good seed years. [Cf. *For. Abstr.* 10 (No. 1765).]

2660. JEMISON, G. M., and KORSTIAN, C. F. **Further results on Loblolly Pine seed production and dispersal.** *J. For.* 47 (12), 1949 (968–70). 2 refs.

Records of Loblolly Pine seed production and dispersal 1944–8 confirm previous observations made 1936–44 [cf. *For. Abstr.* 6 (230)]. The following additional information has become available:—(1) A shelterwood, in which only the most fruitful trees of the original stand remained, provided enough viable seeds for stand regeneration within 5 years of the date of cutting (1942). (2) Prevailing winds influenced the direction and distribution of seeds. Few sound seeds are carried downwind more than 300 ft., and very few seeds are deposited in the opposite direction at distances greater than 75–100 ft. (3) There is a slight decrease in the % of viable seed from 69% at the source to 62% at 300–400 ft. downwind. (4) Good seed crops will supply enough viable seeds to ensure germination of at least 1,000 seedlings per acre, but seedling establishment of Loblolly Pine under conditions such as exist on all but the poorer sites in the Duke Forest cannot be assured unless competing shrubs and trees are removed by cleanings or other methods of control. *Authors' summary.*

2661. HARRIS, K. F. **Tree bicycle proves practical forest invention.** *B.C. Lumberm.* 34 (1), 1950 (72, 74).

Description of a Swiss climbing device used in seed collection. [Cf. *For. Abstr.* 8 (No. 2384).]

2662. BAISENGER, D. **New cone stripper speeds collection of Hemlock cones.** *J. For.* 47 (12), 1949 (983–4).

Describes an easily made device (illustrated) for stripping cones from cut branches of Hemlock. It consists of a set of $\frac{3}{8}$-inch round steel rods, set at intervals of $\frac{3}{8}$-inch, like rake teeth, in a frame over a sacking hopper. The branches are drawn through the teeth and the cones fall into the sack.

2663. CARMICHAEL, A. J. **Comparison of infra-red lamps and convection kiln in tree seed extraction.** *Res. Rep. Ont. Dep. Lds. For.* No. 20, 1949. pp. 9 + 2 gphs. 2 refs.

The machine designed by the Ontario Department of Land & Forests for extraction of seed by heat from infra-red lamps [cf. *For. Abstr.* 10 (No. 200)] is described and the relative cost of extraction by this method and by a conventional kiln are analysed. It is concluded that the use of the infra-red extractor is advisable if more than 475 bushels of Red Pine, 300 of Jack Pine or 225 of Scots Pine are processed in a 3-month period. The cost of installation is less than that of an adequate convection kiln, and, if at least the above-mentioned quantities are handled, the cost of production is lower.

2664. GOULD, C. J., and REYNOLDS, C. E. **Treating Douglas-Fir seed with 'Spergon' before stratification.** *J. For.* 47 (12), 1949 (984).

Treatment of Douglas Fir seed with Spergon not only prevented loss of many seeds from moulds (mostly *Fusarium* sp.) during stratification, but also slightly increased the germination % of the remaining healthy seeds. Treatment both before and after stratification generally gave better results than did a single pre-stratification treatment. Small-scale experiments with Sitka Spruce seed also gave good results.

2665. RUDOLF, P. O. **Cold soaking—a short-cut substitute for stratification?** *J. For.* 48 (1), 1950 (31–2). 3 refs.

Tests were made of the efficacy of cold-water soaking for 7 or 14 days as a substitute for stratification for 2 months. Average germination % after 40 days, of seed soaked for 14 days, was as follows (comparable figures for stratified seed in brackets):—*Picea mariana* 74 (72), *Larix laricina* 53 (52), and *Abies balsamea* 18 (37). In the two instances where comparisons were possible, it appeared that changing the water weekly was as satisfactory as changing it more often.

2666. FOWELLS, H. A. **An index for Sugar Pine seed.** *For. Res. Notes Calif. For. Range Exp. Sta.* No. 64, 1948. pp. 5. 2 refs.

A strong negative correlation was found to exist between specific gravity of cones and seed germination of *Pinus lambertiana*. It is suggested that this might be used as a method of determining whether cones were ready to be gathered. If, e.g., 85% germination is desired, the cones should not be picked until the average sp. gr. of cones on tree is 0·80. Possible sampling methods are discussed.

23.23.3. *Methods of Sowing*

See also *For. Abstr.* 11 (Nos. 2487, 2623).

2667. COSSITT, F., and TOMLINSON, H. **Planting from the skies.** *Sth. Lumberm.* 179 (2249), 1949 (176–7).

Describes an undertaking of the U.S. Forest Service in the Southern region, where 1,230 acres were sown with *Pinus palustris* from the air. The seed (3,590 lb.) was clean and dewinged. Half had been kept in cold storage since 1946, and half was fresh. It was sown from a height of about 75 ft. in strips 50 ft. wide. The fresh seed gave an initial establishment of 45–65%, and the stored seed 7–17%, the difference being largely due to the germination % of the seed. Ten months after sowing it was clear that acceptable stands had been established. The success of the operation was probably due to the following factors:—(1) the sowings were made in November soon after rain, (2) warm, rainy weather continued till January, and (3) the area was burned over in advance and town ant colonies were poisoned.

23.24. Formation of Stands by Planting

See also *For. Abstr.* 11 (Nos. 2674–5, 3364, 3427–8).

2668. SMITH, B. J. **Silvicultural work at the Sault Ste. Marie division.** *Pulp Paper Mag. Can.* 51 (1), 1950 (112, 114, 116, 118).

Reviews work of the Abitibi Power & Paper Co. Ltd. in establishing conifer plantations in this division.

2669. AMIDON, G. B. **The planting job in the Lake States.** *Pulp Paper Mag. Can.* 50 (12), 1949 (126–8).

Deforested land requiring planting in the Lake States totals over 5 million acres. Progress already made is summarized and costs are discussed. The maximum justified by current stumpage values is *ca.* $15.00 per acre.

2670. BULL, H. **Cypress planting in southern Louisiana.** *Sth. Lumberm.* 179

(2249), 1949 (227–30). [Southern Forest Experiment Station.]

Describes planting by the Joseph Rathborne Land Co. of Harvey, La., of about 3,200 Bald-Cypress [*Taxodium distichum*] seedlings in a Louisiana swamp, where the depth of water was apparently too great for natural regeneration after logging. In January 1948, 1- and 2-year-old wildings were planted in 14 in. of water. In November, survival of 1-year-old seedlings was as follows:—submerged less than 20 days—67%, submerged 20–29 days—55%, submerged 30–45 days—31%. All the 2-year-old seedlings (none of which had been submerged) survived. Large-scale planting with nursery stock in January and February 1949 gave, in July, 100% survival of seedlings that were at least 30 in. long (including the tap-root) when planted. Two-year-old seedlings had no advantage over 1-year-old of sufficient length. Spacings between 6 × 6 and 8 × 8 ft. were used. [Cf. *For. Abstr.* 10 (No. 1751).]

23.25. Formation of Stands by Vegetative Reproduction

2671. Hageman, R. H., Delgado, R. F., and Childers, N. F. **The use of dynamite in lifting Bamboo clumps for propagation.** *Trop. Agriculture, Trin.* 26 (7/12), 1949 (122–3 + 7 photos). 3 refs. [Federal Experiment Station, Mayaguez, Puerto Rico.]

Report on experiments to determine the feasibility of using dynamite to reduce the time and expense involved in digging up the rhizomes by hand. The method was as follows: The culms were cut down to within a few inches of the ground, and holes, 1½ in. in diameter and equally spaced at a minimum interval of 18 in., were made in the ground round the circumference of the Bamboo clump, using a soil auger or a pointed, tapered, steel rod. The holes were dug to a depth of 30 in., slanted at an angle of 45° towards the centre of the clump, so that the dynamite was directly beneath the clump divisions. In these trials, electric detonating caps and 40% dynamite were used, and fired by blasting machine. Further trials are necessary to determine the minimum charge necessary to remove clumps of different sizes, but the present data indicate that the use of dynamite, especially on the larger clumps, required the expenditure of ¼ the man-hours and was ½ as expensive, as hand digging. On the smaller clumps, the use of dynamite reduced the man-hours to ⅛, though the total cost was slightly greater than digging by hand. The blast did not injure the Bamboo, as the entire mass clung tightly together and was lifted out in a solid saucer-shaped chunk. The clump divisions that were blasted out, sprouted and grew as well when planted, as did those that were dug by hand. [Cf. *For. Abstr.* 11 (No. 2526).]

23.26. Plant Rearing. Nursery Practice

See also *For. Abstr.* 11 (Nos. 2490, 2516–26, 2629, 2701, 3263, 3270, 3339, 3357, 3392).

2672. Acosta Solis, M. Manual práctico para la formación de almacigas y viveros forestales. **[Practical handbook for the establishment of forest nurseries.]** *Publicación, Departamento Forestal del Ecuador, Quito* No. 6, 1949. pp. 38. 7 refs. [Span.]

Nursery practice and planting methods.

2673. Veiga, A. de Arruda. A pesquisa florestal. **[Forest research.]** *Rev. Agric., Piracicaba* 24 (11/12), 1949 (329–34). [Port.] A.P.B.

Briefly describes methods used at the Horto Florestal de Batatais for making a statistical analysis of plots of seedlings grown at different densities.

2674. Veiga, A. de Arruda. Pinheiro brasileiro—*Araucaria angustifolia.* **[Paraná Pine.]** *Rev. Agric., Piracicaba* 24 (9/10), 1949 (309–18). [Port.] [Batatais Forest Nursery.] A.P.B.

Direct sowing of *Araucaria angustifolia* is not always advisable, since its success depends largely upon the degree of humidity at the time of sowing. The author describes experiments, begun in 1944 and continued for 3 years, in raising *A. angustifolia* from seed. Seed collected in April was sown in May or June in deep boxes or pots, 20 cm. high. In the following rainy season—January or February—selected seedlings were ball-planted with good results. If the seedlings are to be transplanted in October or November, shallower pots, i.e. 10 cm. high, can be used. Some data are given on height and diameter growth of *A. angustifolia* in plantations at Batatais, spaced 1 × 1, 1·6 × 1·6 and 2 × 2 [m.?]. Short notes on

date of planting, site, type of soil etc., are included.

2675. Ortuño Medina, F. Algunas consideraciones sobre la protección de pequeñas plantas en repoblaciones con *Pinus canariensis*. **[The protection of transplants in reafforestation with *P. canariensis*.]** *Montes, Madrid* 5 (30), 1949 (483–6). [Span.]

Describes a modification of the tube-planting method for *Pinus canariensis* [cf. *For. Abstr.* 11 (No. 256)]. The rapid root development of this species and the necessity for transplanting before the roots emerge from the end of the cylinder, cause the seedlings to be transplanted far too young (at 1–2 months old). Methods of root pruning have been evolved in the nurseries of Tenerife, Canary Islands, by which two types of transplant can be obtained. (1) Produces a plant 15–20 cm. high, suitable for planting at altitudes not greater than 1,800 m. The plant remains 8–10 months in the nursery, the first pruning being made 1 or 1½ months after germination. The cylinders and plants are lifted from the original seedbed for pruning, and the plants are graded according to size before being replanted (still in their cylinders) in beds protected from excessive insolation. After another 1 or 1½ months the whole operation is repeated, and a final pruning is made about 2 weeks before planting out. The size classification is important for avoiding the suppression of the smaller plants. A thorough watering before the final planting is essential. (2) Produces a stronger transplant of about 30 cm. height, which remains 14–16 months in the nursery. The root-pruning and grading operations are the same as for (1), but the third pruning takes place 8 months after the second, and the fourth a few days before final planting. These methods have also been used successfully with other species of Pine.

2676. Leibundgut, H. Verschulung von Laubholzkeimlingen. **[Transplanting broadleaved seedlings.]** *Schweiz. Z. Forstw.* 101 (2/3), 1950 (119–21). [G.f.]

Experiments were made in transplanting seedlings of Lime [*Tilia parvifolia*], Hawthorn, and Ash. This is best done when the seed leaves are fully developed, but no primary leaves have yet formed, i.e. 10–20 days after sowing. The seedlings should be well watered and then taken up carefully, preferably on a dull day. Plants treated in this way are, at a year old, much superior to those which have not been moved. At one year old, the figures for treated and untreated Ash were:—average shoot length 27·0 cm. and 14·2 cm. respectively, and average length of main root 43·8 cm. and 37·9 cm. The corresponding figures for Hawthorn were 34·3 and 14·4 cm., and 43·0 and 26·9 cm. There was much more forking in the roots of the treated plants.

2677. Machado, D. Pereira. Alguns ensaios de transplantação do sobreiro. **[Experiments in transplanting Cork Oak.]** *Bol. Junta nac. Cortiça, Lisboa* 12 (134), 1949 (63–5). [Port.]

Outlines a method of raising Cork Oak seedlings with a root system that will bear transplanting. The seed is sown in mid-November at intervals of 0·05 m. in rows 0·15 m. apart. In mid-January the seedlings are root-pruned *in situ* by passing a long sharp knife down the rows at an angle of 45°, so that the tap roots are cut down to a length of *ca.* 3 cm. By mid-March the seedlings have acquired a well developed root system, and are ready for planting out.

2678. Chadwick, L. C., and Houston, R. **A preliminary report on the pre-storage defoliation of some trees and shrubs.** *Proceedings of the American Society for Horticultural Science, E. Lansing* No. 51, 1948 (659–67). 4 refs. [Ohio State University, Columbus.] E.M.B.

The experiments reported show that sprays of Nacconol NR (Na salts of alkylated benzene sulphonic acid) will cause satisfactory defoliation of nursery stock before storage. The degree of defoliation will vary with the species, the kind and concentration of the material applied, and the time of year. The earlier in autumn the application is made, the stronger must be the concentration. A 1% solution of Nacconol NR plus a 3% summer oil was effective in causing premature defoliation of *Acer tataricum, Cotoneaster divaricata, Euonymus europaea* and *Viburnum lantana*. A 2% solution of Nacconol NR, with a 3% summer oil, was effective in causing from 75 to 100% defoliation of Columnberry, Barberry, *Ligustrum ibolium, Lonicera maackii, Quercus imbricaria, Q. robur, Rhamnus davurica, R. frangula, Viburnum burkwoodii, V. macrocephalum sterile, V. opulus*, and *V. opulus nanum*. In most cases defoliation occurred within 7–10 days of

the application. No injury to stem or buds was apparent. *From authors' summary.*

2679. **Nursery technique.** *Rep. For. Timb. Bur. 1948*, 1949 (16).

The effect of pruning the tops of planting stock kept in the nursery beds for the second year was tested with *Pinus radiata* and *P. pinaster*. The pruned 2-year-old seedlings were more balanced than the unpruned, though side branches had to be removed from some of the pruned *P. pinaster* plants. Establishment, though not quite so good as with 1-year seedlings, was better with the pruned than with the unpruned plants.

23.27. Arboriculture

See also *For. Abstr.* 11 (No. 2697).

2680. CUMMINGS, M. B. **Yews for nurseries and gardens.** *Amer. Nurserym.* 90 (12), 1949 (13–4, 51–2).

2681. O'ROURKE, F. L. **Honey Locust [*Gleditsia triacanthos*] as a shade and lawn tree.** *Amer. Nurserym.* 90 (10), 1949 (24–9).

23.3. *Afforestation*

See also *For. Abstr.* 11 (Nos. 2448, 2488, 2492, 2502, 2698–9, 3246).

2682. WITTICH, W. **The possibility of afforesting soils of the Old Red Sandstone in Ireland.** *Irish For.* 6 (1/2), 1949 (13–21). *Transl.* from *Intersylva* 2 (3), 1942. [*For. Abstr.* 8 (No. 2398).]

2683. BENDA, P., and POURTET, J. Politique forestière et reboisement en Grande-Bretagne. **[Forest policy and afforestation in Great Britain.]** *Rev. for. franç.* No. 9/10, 1949 (435–46 + 4 photos). [F.]

An account of policy and methods of afforestation employed by the Forestry Commission in Wales.

2684. KISS, F. Harc az elemi csapásokkal a Duna-Tisza Közti homokterületeken. **[Measures to counter natural disasters in the sandy areas between the Danube and Tisza.]** *Erdész. Lap.* 83 (2; 3), 1944 (51–68; 101–8). [Hu.g.f.e.]

The writer gives a historical survey, over 5 main periods, from the Avar era to the present day, of the changes in soil level (due to wind, etc.) in this area. In the past 50 years afforestation has done much to prevent major changes of soil level with consequent effects on the water table. The position still needs improving, in order to keep the water table constant. Sandy areas in agricultural use must be levelled (except the brown and black sand), the rising ground perhaps by terracing, to save expense. Parts not so far cultivated are normally poor and undergo greater changes of soil level; these should be afforested.

Where the soil is very poor, Austrian and Scots Pine should be planted, as they improve the soil. Where the soil is so thin that it supports only lichen and xerophytic herbs, 2- or 3-year-old Scots Pine transplants should be used. This species may also be used in wet ground, as it stands water better than Austrian Pine; plantings of this kind do not need much cultivation of the soil.

Bruckner found that the water table had a rise and fall on a 35–35-year cycle. Regular observations of the water level at the Öttömös well (114 m. above sea level) showed that from September 1922 to the end of December 1938 the highest level was 114 m., i.e. to the top of the well, and the difference between the highest and lowest levels was 220 cm. The writer claims also to have established that the water table rises more slowly than it falls, so that dry seasons are more frequent than wet.

Though the water table is the result of unknown factors operating below ground, careful observation over many years makes it possible to establish with reasonable, if not mathematical, exactness, when it will rise. From long experience, the writer concludes that in the sandy areas between the Danube and Tisza, Austrian and Scots Pine can be successfully planted in the period of fall of the watertable only if the rainfall is exceptionally heavy and well distributed, while during its period of rise and the years immediately before and after, these 2 species can be planted with certain success. For fair results in the period of fall the soil should be dug in the autumn and early spring. Digging to 45–50 cm. is enough, but 60 cm. gives better results.

Since the water-table level is closely dependent on the rainfall, care must be taken in draining not to disturb the level if it is right.

Flood damage is the other menace against which afforestation affords protection. Austrian and Scots Pine are again the most useful species.

In certain places apparently favourable to Robinia, this species nevertheless dies off at *ca.* 10–15 years, when weeds get a hold and the aeration of the soil declines. The soil first needs improvement if Robinia is to be used. Manure is not available in adequate quantities. Austrian and Scots Pine, however, are well adapted to dry sandy soil, and return nutrients in their litter: on shaded soil and with a good fall of needles, a stand of Pine can so improve the soil's fertility that in 40–50 years it can support all broadleaved species, including Robinia. Examples for Austrian Pine are cited. The writer recommends Scots Pine only for the worst waterlogged places because it is more subject than the Austrian Pine to insect pests and its timber is of poorer quality.

2685. HAIBACH, D. J. **Reforestation in Japan.** *J. For.* 47 (12), 1949 (971–7).

Describes general principles of afforestation, species used, nursery practice, planting methods etc., the present situation and policy. In Honshu, Shikoku and Kyushu, the species principally planted are *Cryptomeria japonica*, *Chamaecyparis obtusa*, *Pinus densiflora*, *P. thunbergii* and *Larix leptolepis*; in Hokkaido, *Abies mayriana*, *Picea jezoensis*, *P. excelsa*, *Fraxinus mandshurica* var. *japonica*, and *Castanea crenata*; in the rest of Japan, *Quercus acutissima*, and to a lesser extent *Castanea crenata* and *Cinnamomum camphora*.

2686. ROSSIGNOL, C. Travaux forestiers à but conservatoire entrepris en Province du Kivu. [**Afforestation for conservation purposes in the Province of Kivu.**] *Bull. agric. Congo belge* 40 (3/4), 1949 (2367–78). [F.]

2687. **Nassella tussock control reserves.** *Rep. N.Z. For. Serv. 1948–9*, 1949 (22).

Nassella tussock grass, a S. American species introduced into New Zealand, has become a serious pest. The legislature has now decided that where a Nassella Tussock Board or County Council considers it desirable, the Minister of Land may acquire any tussock-infested land as Crown land and, with the concurrence of the Commissioner of State Forests, may declare the land, or part of it, a Nassella tussock control reserve. This course will be adopted only for land which is so heavily infested that agricultural methods of control would be ineffective. These reserves are to be administered by the Forest Service as if they were state forests. It is not expected that trees will actually suppress the tussock in most cases, but there is some evidence that they will entrap a proportion of its high-flying seedheads and in this way prevent the spread of the seed down wind on to uninfested land. Trees with a rapid height growth are required, and the early planting of tactically placed strips having regard for topography and prevailing wind-direction, is advantageous. Unfortunately, tussock reaches its maximum development in localities which are suited only for inferior tree growth.

24. TENDING OF STANDS AND TREES

See also *For. Abstr.* 11 (No. 2628).

2688. KINKA, W. Pielęgnowanie upraw leśnych, czyszczenia i trzebieże w pojęciu nowoczesnym. [**Modern methods of tending, cleaning and thinning plantations.**] *Wydaw. pomocn. tech.-gosp. Inst. Bad. Leśn.* No. 15, 1948. pp. 112. 12 refs. [Pol.]

A general account of modern methods, written primarily for forest officers.

24.2. *Thinnings*

See also *For. Abstr.* 11 (Nos. 2621, 3008, 3226, 3385, 3427).

2689. DREES, E. M. Enkele gegevens voor de dunning van *Agathis*-opstanden. [**Some preliminary remarks on thinning in plantations of *Agathis loranthifolia*.**] *Tectona* 39 (3), 1949 (211–23). [Du.e.]

A. loranthifolia is a typical shade-demanding tree, and large plants should be used as planting stock. The colour of the leaves is yellowish or brownish until closed canopy is formed. Later, the crowns form a deep, dense and dark canopy, but suppressed individuals are retarded, not killed. A dense stand is necessary to produce natural pruning; moreover, crown width increases very little after thinning; and for both these reasons heavy thinning is inadvisable, and frequent light thinnings are recommended. Even then, gaps in the canopy may occur, which result in unfavourable soil vegetation. It is therefore advisable to have an understorey of suppressed trees to protect the soil, stimulate natural pruning, and eventually to protect the natural regeneration. This may be done by delaying thinnings until the

plantation has assumed a definite two-storeyed structure of dominants and suppressed individuals respectively. Root studies have shown that on well drained soils there is no danger of excessive root competition.

2690. STOTT, C. B. **Grade labeling tree vigour in forest management.** *J. For.* 47 (11), 1949 (900–3).

A pure 48-year-old, even-aged Jack Pine stand responded well to heavy thinning from below, favouring vigorous dominant and co-dominant trees. The importance of vigour classes as a basis for thinning such stands is urged.

2691. **Pine thinning studies.** *Rep. Tenn. Vall. Auth.* 1949 (13).

Time/cost records kept on 3 operations shows that barking is the largest item of cost in the production of untreated fence posts. Costs of mechanical barking ranged from 40 to 70% of the total, depending on the species and the time of year.

Pruning and fertilizing costs were determined for two Pine stands. Pruning 200 crop trees per acre cost $8.00 for Shortleaf and $22.00 for Loblolly Pine. Fertilizing the same number of trees with 50 lb. NH_4NO_3 at 4 c. per lb. cost about $2.75/acre.

2692. **Thinning a 13-year-old Loblolly Pine plantation on clay-pan soil in Southern Illinois.** *Sta. Notes Cent. St. For. Exp. Sta.* No. 56, 1949. pp. 2.

2693. FILIP, S. M. **Thinning young Oak stands for small mine timbers—at a profit.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 28, 1949 pp. 13.

24.3. *Opening of the Canopy. Release and Improvement Fellings (including Poisoning and Girdling)*

See also *For. Abstr.* 11 (Nos. 2640–1, 2843, 3262 et seq.).

2694. MACLEAN, D. W. **Improvement cutting in tolerant hardwoods.** *Silv. Res. Note Dom. For. Serv.* No. 95, 1949. pp. 19. 5 refs.

This report deals with a girdling and thinning experiment in a tolerant hardwood forest near Thurso, Quebec. The original stand had been mixed Pine and tolerant hardwoods, but first the Pine and then the merchantable hardwoods had been removed, leaving the forest unproductive. The object of this experiment was to determine whether areas of this kind could be put back into production by girdling or felling unmerchantable trees. Three transect plots were established, two to be treated and one as a control. The 5 most valuable species were favoured on the treated plots. The time in treating the first plot was limited to one man-day/acre; all large wolf trees were girdled and the smaller trees of undesirable species were felled so far as time would allow. On the second plot all defective trees of the desirable, and almost all trees of the undesirable, species were girdled or felled. The treatment on this plot averaged about 2 man-days/acre. Each plot was made up of 3 site types:—(1) valleys and lower slopes, (2) upper slopes, and (3) ridges. It is apparent from the observations of the first 10 years that the response to treatment has been excellent on all 3 site-types of the heavily treated plot, and good, though less so, on the lightly treated plot. Response was least on the ridges.

2695. HERMAN, F. R. **Use of "ammate" for poisoning Ponderosa Pine in stand improvement.** *J. For.* 47 (12), 1949 (966–7).

A rather fuller report on experiments made at the Southwest Forest and Range Experiment Station. [Cf. *For. Abstr.* 11 (No. 284).]

2696. B[ARNARD], R. C. **Tree killing with synthetic hormone, 2,4-D.** *Malay. Forester* 13 (1), 1950 (41).

In May 1949, 112 trees comprising 48 species were treated as follows:—(1) 32 trees of 11 species were ring-girdled to a width of 2–3 in. and a depth of 1 in. into the sapwood. (2) 38 trees of 22 species were frill-girdled and a solution of 1 lb. sodium arsenite in a gallon of water was poured into the frill girdle. (3) 53 trees of 35 species were treated as in (2) but substituting 1 lb. 2,4-D in a gallon of water. After 7 months the condition of the trees under the 3 treatments in % of the number treated, was as follows:—Dead (1) 43, (2) 66, (3) 42; dying (1) 10, (2) 16, (3) 16; live (1) 47, (2) 18, (3) 42. It appears, therefore, that 2,4-D applied in this way is less effective than sodium arsenite.

24.4. *Shelterbelts. Windbreaks*

2697. BEDDALL, J. L. **Hedges for farm and garden.** Faber & Faber Ltd., London. 1950. pp. 360 + 83 photos. Price 25*s*.

Includes chapters on:—The hedges of Britain; the history of hedges; hedges and the farmer; hedge plants for the farm; hedgerow trees; hedges for the fruitgrower; planting farm hedges; care of farm hedges; stone and turf hedges; fences; gates and stiles; grubbing and clearing hedges; the garden hedge; suggestions for garden hedges; hedges as screens or windbreaks; seaside hedges; soil preparation; planting and after-treatment; training and trimming hedges; renovation and transplanting hedges; propagation; hedges and the law; pests and diseases; costs; lists of suitable plants for different purposes.

2698. BODROV, V. A. Stepnoe lesorazvedenie. (Istoricheski ocherk). **[Steppe afforestation [in Russia]. (A historical outline).]** *Priroda, Moskva* 38 (12), 1949 (25–31). 7 refs. [Russ.] A.P.B.

2699. TKATCHENKO, B. Défense contre la sécheresse et contre l'érosion dans les steppes de la Russie méridionale. **[Protection against drought and erosion on the steppes of South Russia.]** *Agron. trop.* 5 (1/2), 1950 (2–41). 54 refs.

Mainly an account of the planting of forest belts and windbreaks. [Cf. *For. Abstr.* 11 (Nos. 289–97).]

2700. CHEPIL, W. S. **Wind erosion control with shelterbelts in North China.** *Agronomy Journal, Madison* 41 (3), 1949 (127–9). H.S.B.

Describes an old-established method of sand-dune protection developed near Kaifeng (Honan Province). Trees or shrubs, often Willow or *Tamarix*, are grown in belts, rows being established at not more than 50–60 ft. spacing, with others, 100–500 ft. or more apart, running at right angles to them. The whole area is thus divided into small rectangles, protected on all four sides. The more erodible the soils, the closer the belts are planted. Spacing between individuals varies with the species; *Tamarix* are usually planted 1 ft. apart, Willows, 1–3 ft. apart, and Poplars and other tall trees, 4–8 ft. apart. Low bushes are often interplanted with the tall trees for added protection. In 1947, large, sandy wastes created by flooding of the Yellow River during the war, were reclaimed by UNRRA and the Chinese government, by planting shelterbelts according to this "checkerboard" system.

2701. CUTHBERTSON, E. G. **The Athel tree (*Tamarix (aphylla) articulata*). Valuable for shelterbelts in western districts.** *Agricultural Gazette of New South Wales, Sydney* 59 (8), 1948 (395–8, 402). 5 refs. L.S.

The Athel tree has proved a useful species for shelterbelts and windbreaks in Australia, especially in the western districts of New South Wales [cf. *For. Abstr.* 7 (No. 1585)]. Under favourable conditions the tree grows rapidly, increasing *ca.* 10–15 ft. in height each year. A spacing of 10 ft. is recommended, both in single or multiple-row windbreaks. The ground must first be ploughed and harrowed. Propagation is most easily achieved by cuttings, taken from trees at least 3 years old, and planted out directly. Cuttings should be *ca.* 8 in. long, with the basal cut close to a bud and the top cut *ca.* ¼ in. above a bud. A hole about 2 × 2 × 2 ft. is dug and filled with a mixture of 60% sand and 40% loam. The cuttings are put in with 3 in. projecting above the soil, which is kept continually moist by constant watering. Where watering is impossible, good results can be obtained by striking the cuttings in kerosene tins, and planting them out when they reach a height of *ca.* 1 ft. Galvanized-iron tubes may also be used, in which case the cuttings are put out when 6–9 in. high.

2702. SCHMAUTZ, J. E. **Preliminary report of a study of Montana shelterbelts.** *Proceedings of the Montana Academy of Sciences* 7/8, [1948?] (11–5).

2703. DAMBACH, C. A. **A study of the ecology and economic value of crop field borders.** *Graduate School Studies, Ohio State University (Biological Science Series)* No. 2, 1948. pp. 205. 150 refs. L.S.

A study of the insect ecology and economic relations of the borders of arable fields in Ohio was made during 1938–42. Six types of border were investigated:—(1) clean tilled, (2) mixed herbaceous, (3) sod, (4) a mixture of sod and shrubs, (5) shrub, (6) planted Osage Orange [*Maclura pomifera*] hedges. The value of land per 100-acre farm made unavailable for cultivation is $33.00, $137.50, and $236.00

respectively for (4), (5), and (6), in excess of that for types (1), (2) and (3). In addition, a direct loss in crop yields adjacent to borders supporting tall shrubs and trees was evident. The area so affected varied in width up to 2 or more rods.

Studies made during two winters, indicated that hibernating insects and other invertebrates occur in greater abundance in field-border litter than in litter from adjacent arable fields, but that the proportion of crop pests to total insect populations was much less, particularly in shrub and Osage Orange litter. Collections made on vegetation in various types of field border during 3 successive summers, indicated that comparatively few insects injurious to grain and forage crops, occur on woody vegetation, and that many beneficial insects do frequent such areas. Many insects which are pests of corn and small grain occurred in sod borders, but a great number of these appear to complete their life cycle in the borders and do not migrate into the adjacent fields.

Populations of breeding birds in borders of types (4), (5), and (6) greatly exceeded those in (1), (2) and (3). Many of them, however, are seed or fruit eaters or, if they do feed on insects, confine their efforts largely to those on woody plants.

Populations of small mammals are much greater in field borders than in adjacent fields; e.g. borders of type (4) had mammal populations 9 times as large per unit area as the highest field population. With the exception of the Pine mouse, the mammals in (5) and (6) were of species either neutral or beneficial in food habits. Borders of type (3), however, supported large populations of mammals injurious to crops.

In general it appears that less risk of crop pests is involved in the use of woody field-border vegetation than of other types, in areas where the predominant crops are grain and forage plants. The converse is probably true with respect to orchards and nursery-gardens.

24.5. *Pruning*

See also *For. Abstr.* 11 (No. 2691).

2704. ROWLAND, C. A. **Early results of bud-pruning in Slash Pine.** *J. For.* 48 (2), 1950 (100–3). 6 refs.

In 1947 four sets of plots were established near Athens, Ga., in 2-year-old plantations spaced 6 × 6 ft., to determine the effectiveness of bud-pruning [cf. *For. Abstr.* 11 (No. 300)] when applied to *Pinus caribaea*. Four treatments were used:—(1) bud-pruned and thinned to a 12 × 12-ft. spacing; (2) bud-pruned but not thinned, with the pruned trees spaced 12 × 12 ft. and the untreated trees remaining in the plot; (3) neither bud-pruned nor thinned; (4) not bud-pruned, but thinned to a spacing of 12 × 12 ft.

At the end of the first growing season after treatment, there was no appreciable difference in either diameter growth or height growth between any of the treatments. At the end of the second growing season, the 2-year average diameter growth for the pruned trees was 1·3 in. and 2-year average height growth 6 ft., compared with 1·7 in. and 6·2 ft., respectively for the unpruned. The cost of bud-pruning was somewhat less than that of conventional pruning; pruning to date has been at a rate of 3·37 ft./man-minute. Five or six annual debudding operations should produce a clear 16-ft. log. Bud-pruning may reduce the damage from fusiform rust by reducing the area of tender new growth in which the infection starts. A modified form of bud-pruning, using small pruners on branches, and breaking dormant or swelling buds, appears to be as fast as removing only dormant buds. A pole tree-trimmer is more satisfactory than a ladder for pruning above the height that can be reached from the ground. The optimum tree height for initial pruning was 3–6 ft. The first 2½ ft. of the stem should not be pruned initially, but in subsequent prunings any rust-infected branches in that region should be removed.

2705. **Pruning.** *Rep. For. Timb. Bur. Aust. 1948*, 1949 (16).

No significant interference with increment, nor any serious development of epicormic shoots, resulted from pruning to heights of 8 ft. in *Pinus radiata* stands of a mean dominant height of 25 ft. A study of the production of clear wood following pruning of *P. radiata* revealed that the diameter of the core unsuitable for peeling to clear plywood is up to 1½ in. greater than the actual knotty core size. Very little clear timber was recovered in either sawing or peeling from even dominant trees 21 years of age in a good-quality stand which

had been pruned at 10 years of age and thinned at 13 years.

27. TREATMENT OF EXCESSIVELY OPEN STANDS

See also *For. Abstr.* 11 (No. 2501).

2706. Wood, R. F. **Rehabilitation of devastated and derelict woodlands.** *Quart. J. For.* 44 (1), 1950 (5–10).

The problem of finding a suitable form of treatment for the large area of devastated and derelict woodland in Great Britain is discussed. This problem, which is associated mainly with the broadleaved forest types, has been caused principally by the fellings made necessary by two World Wars, though mismanagement and rabbits have also had their effects. An account is given of the most important types of woodland concerned, and of the various methods of treatment which are possible. The problem has two aspects, one silvicultural, the other economic. In view of the high costs of the present-day operations, economic considerations must be kept in mind when silvicultural treatment is being designed. *Author's summary.*

3. FOREST UTILIZATION. FOREST TECHNOLOGY

See also *For. Abstr.* 11 (Nos. 2462, 2466–8).

2707. GLESINGER, E. **The coming of age of wood.** Secker & Warburg, London. 1950. pp. xvi + 278. Price 12*s.* 6*d.*

An attempt to show the general public the importance of wood in the modern world, and to describe the ways in which it is used.

2708. VAROSSIEAU, W. W. Serie VI. Documentatie en voorlichting No. 2. Een overzicht van werkzaamheden verricht door de afd. Hout, ten behoeve van handel en industrie. **[Series VI. Documentation and information No. 2. Survey of the work done by the Forest Products Division and of its value to trade and industry.]** *Circ. centr. Inst. Mater. Onderzoek. Afd. Hout* No. 11, 1949. pp. 19. [Du.e.]

2709. **Partial list of [United States] government publications of interest to architects, builders, engineers and retail lumbermen.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1081 (revised) 1949. pp. 19. P.R.

A list of publications on fungus defects in wood products; the growth, structure and identification of wood; grading, mechanical properties and structural uses; glued wood construction; wood seasoning; wood finishing; and wood preservation.

31. PROPERTIES AND ANATOMY OF WOOD. WOOD RESEARCH

2710. CAMPREDON, J. **Le bois.** [Wood.] Presses Universitaires de France, 108 Blvd. St. Germain, Paris. 1949. pp. 128. 17 refs. [F.] Price [3*s.*]

The first part (pp. 1–57) deals with the formation, structure, defects and qualities, and physical and mechanical properties of wood in general. The second part deals in more detail with the principal commercial species.

31.0. *General Information on Woods*

See also *For. Abstr.* 11 (Nos. 2550, 2590, 2614, 3203, 3394).

2711. BÄRNER, J. Die Nutzhölzer der Welt. **[The timbers of the world.]** Verlag J. Neumann, Neudamm. Vols. 1–3, 1942. pp. 687 + 780 + 803. [G.] P.R.

A list of world timbers, systematically arranged, giving botanical and vernacular names, botanical description, distribution, properties and uses.

2712. **Some commercial timbers of Malaya.** *Timb. Inform. Timb. Developm. Ass., Lond.* No. 38, [1949]. pp. 5.

Describes the appearance, properties and uses of 24 Malayan hardwood timbers.

2713. THOMAS, A. V. **Malayan timbers.** *Malay. Forester* 12 (4), 1949 (201–7 + 2 photos); 13 (1), 1950 (20–7 + 2 photos).

Brief accounts of the properties and uses of: (1) *Dryobalanops aromatica, D. oblongifolia, Koompassia malaccensis,* and *Gonystylus bancanus*; (2) *Tarrietia simplicifolia, Anisoptera* spp., *and Tetramerista glabra.*

2714. BERTIN, A., and MENIAUD, J. **[Timbers of the Cameroons.]** Cie. française du Cameroun. [Agents for United Kingdom: Flatau, Dick & Co., London.] [1949.] pp. 62. [E.] Transl. by F. W. Jane.

Properties, uses and working qualities, including data for band-saws, for the following species:—*Mitragyna* spp., *Terminalia superba, Pterocarpus soyauxii, Afzelia bipindensis, Distemonanthus benthamianus, Canarium schweinfurthii, Piptadenia africana, Tieghemella africana, Baillonella* spp.; *Lophira alata, Alstonia congensis, Erythrophloeum* spp., *Pycnanthus kombo, Erythroxylum mannii, Staudtia* spp., and *Sarcocephalus* spp.

2715. LUCHINI, R. Legnami utilizzabili della Somalia Italiana. **[Useful timbers of Italian Somaliland.]** *Riv. Agric. subtrop. trop., Firenze* 42 (1/3), 1948 (55–60). [It.it.e.] L.S.

Gives some account of the following species:– *Mimusops degan, Trichilia jubensis, Acacia stenocarpa, Afzelia quanzensis, Antidesma venosum, Sorindeia obtusifoliolata, Excoecaria venenifera, Thespesia danis, Garcinia ferrandii, Hunteria africana, Cordia ravae, Piptadenia erlangeri,* and discusses possible substitutes for Ebony and Teak.

2716. MIRANDA, F. Observaciones botánicas en la región de Tuxtepec, Oax., con notas sobre plantas útiles. [**Botanical observations in the region of Tuxtepec, Oax., with notes on useful plants.**] *An. Inst. Biol. Univ. Méx.* 19 (1), 1948 (105–36). 7 refs. [Span.] C.G.B.

Contains brief descriptions of a large number of trees, with notes on the uses of their timber and other products, a classified list of the trees according to their uses, and a list of vernacular names with scientific equivalents.

2717. MONTERO GOMEZ, J. Derivados forestales de Costa Rica. [**Forest products of Costa Rica.**] *Rev. Agric., Costa Rica* 21 (7–9), 1949 (289–94; 333–5, 337; 353, 355–7, 359); 22 (1), 1950 (23, 25–9). [Span.] A.P.B.

A list of Costa-Rican forest products with the species (by vernacular names) from which they are derived.

2718. **Hardwoods of the South.** U.S. For. Prod. Lab., Madison. 1949. pp. 16. P.R.

Discusses the properties and working qualities of the hardwoods common in the southern U.S.A.

2719. WOODS, R. P. **Timbers of South America.** *Timb. Developm. Ass., Lond.* 1949. pp. 74.

Gives the standard, botanical, and alternative vernacular names, a general description and an account of the uses, of 87 South American hardwoods and 6 softwoods.

2720. Relação dos nomes mais votados para a unificação da nomenclatura das madeiras nacionais. Resultado de um inquérito promovido pela Associação Brasileira de Normas Técnicas. [**List of names recommended for the rationalization of nomenclature in native timbers. Results of an enquiry organized by the Brazilian Technical Standards Association.**] *Brasil madeireiro* 4 (39), 1948 (36–7). [Port.]

2721. Les bois de la Nouvelle Calédonie. [**The timbers of New Caledonia.**] *Rev. int. Bois* 16 (150), 1949 (231). [F.]

A brief account of the forests of New Caledonia, with the vernacular names, density, and uses, of the principal timber species.

2722. **Nomenclature of commercial timbers including botanical names, genus and species, sources of supply, British Standard references, and sawmilling classification.** Liverpool and District Sawmilling Association, Liverpool 3. 1950. pp. 87. Price 5*s*. P.R.

Some 1,300 trade names, covering 500 species, have been arranged under separate sawmilling classifications: (1) Mild softwoods. (2) Refractory softwoods and mild hardwoods. (3) Medium-textured hardwoods. (4) Refractory hardwoods. (5) Extra-refractory hardwoods. (6) Not classified. Botanical names and British Standard commercial names have been used throughout. An index of trade names and botanical names is given.

2723. DAY, H. A. **Satiné or "Satinay"?** *Cabinet Mkr.* No. 2623, 1950 (336). P.R.

Satiné, formerly used as a cabinet wood in France, was supplied by several species, the bulk of which came from French Guiana, but included Muirapiranga (*Haploclattera paniculata*) of Brazil; it is now obtainable only in small logs, rarely exceeding 8 in. in diameter, and is little used. Satinay (*Syncarpia hillii*), which grows extensively on Fraser Island off the coast of Queensland, provides a good substitute. The wood is a pink or strawberry colour in its natural state, but can be stained to a deep blood-red or fumed to a rich grey-purple. It has the lustre and ripple figuring of the French Satiné; its weight per cu. ft. varies from 46 to 56 lb. It is resistant to fire. It is used for furniture, for veneer and plywood, for panelling, flooring material and tool handles.

2724. JAY, B. A. **The light hardwoods.** *Quart. Rev. Timb. Developm. Ass., Lond.* 2 (8), 1950 (23–5).

The sources of supply and properties of some hardwoods of lower density and a weight range of 30–40 lb./cu. ft. seasoned are discussed, and a list of woods including a few softwoods (*Podocarpus* spp.) is divided into 3 groups by suitability for joinery and cabinet-making.

2725. DESCH, H. E. **Leaves from a consultant's notebook. Discussion of substitutes for established timbers.** *Aust. Timb. J.* 15 (8), 1949 (546, 549–50, 596).

Reviews work accomplished and problems encountered in finding substitutes.

2726. LATHAM, B. **Some economic aspects of secondary timbers.** *Emp. For. Rev.* 25 (4), 1949 (332–6 + 6 photos).

The author tentatively defines a secondary timber from the commercial standpoint as one that would not normally be purchased or used if primary timbers were sufficiently available and there were no currency difficulties to prevent their purchase. He gives some account of some such tropical timbers that have been introduced into European markets at various times during the present century, and enumerates the conditions prevailing at the present time that are favourable to increased use of more such species, e.g. the exhaustion of more favoured species, the world-wide shortage of timber, and the devaluation of the sterling and other Western European currencies.

2727. **Specimen woods Nos. 168–170.** *Suppls.* to *Wood* 14 (12), 1949 (379–80); 15 (1–2), 1950 (19–20; 55–6).

European Larch (*Larix decidua*); Antiaris (*Antiaris africana*); and Agalai (*Chikrassia velutina*).

2728. [IRVIN, D. B.] **New timbers.** *Cabinet Mkr.* No. 2625, 1950 (550). P.R.

The properties and uses of Agba (*Gossweilerodendron balsamiferum*), Danta [*Cistanthera papaverifera*], Mansonia [*Mansonia altissima*], Makore [*Mimusops heckelii*], Chamfuta [*Afzelia* spp.], Ekki [*Lophira alata*], Abura [*Mitragyna* spp.], and Krabak or Mersawa [*Anisoptera* spp.], are described.

2729. **[Colonial timbers.]** *Bois For. Trop.* Nos. 11–12, 1949 (295–302; 429–36). [F.]

Bete (*Mansonia altissima* and *M. nymphaefolia*) and Doussie (*Afzelia bipindensis* and *A. pachyloba*); Bubinga (*Guibourtia demeusii*) and Oboto (*Mammea africana*).

2730. SCHMIDT, E. Übersee-Hölzer. Nr. 11–12. **[Foreign woods, Nos. 11–12.]** *Suppls.* to *Weltholzw.* 1 (12–13), 1949. Each pp. 2. 3 and 5 refs. [G.] P.R.

Okumé (*Aucoumea klaineana*) and Niové (*Staudtia gabonensis*).

2731. LAMB, G. N. **Foreign woods—origin, use, properties and nomenclature.** *Wood Prod.* 54 (11–12), 1949 (26–7; 26–7); 55 (1), 1950 (22, 24).

(*a*) Lacewood (*Cardwellia sublimis*), Torchwood (*Amyris balsamifera*), Tallow-wood (*Eucalyptus* sp.) and Tatjuba (*Bagassa guianensis*).

(*b*) White Chuglam (*Terminalia bialata*), Black Bean (*Castanospermum australe*), New Guinea Wood (*Dracontomelum mangiferum*), and Harewood (*Acer pseudoplatanus*).

(*c*) Tamo (*Fraxinus sieboldiana*), Ciruelillo (*Astronium graveolens* or *fraxinifolium*), Coigue (*Nothofagus dombeyi*), and Hububalli (*Loxopterygium sagotii*).

2732. **The properties of Australian timbers: Radiata Pine** (*P. radiata*). *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 176, 1949 (4).

2733. VENET, J., and DUCHAUFOUR, P. Le bouleau. **[Birch.]** *Rev. Bois Appl.* 5 (3), 1950 (18–21). [F.]

Discusses the botanical characteristics, distribution, structure, strength and chemical properties, defects and uses of *B. verrucosa* and *B. pubescens*.

31.1. *Structure. Anatomy. Identification*

See also *For. Abstr.* 11 (Nos. 2761, 2786, 2813–6, 3245).

2734. LABOUREUR, P. Nouvelle technique de coupes minces d'organes lignifiés. **[New method of preparing thin sections of lignified organs.]** *Bull. Soc. bot. France* 96 (4/6), 1949 (99–101). [F.] O.B.D.

Outlines a method of softening specimens by treating them first with a soap mixture and then with paraffin.

2735. GREGUSS, P. Bestimmung der mitteleuropäischen Laubhölzer und Sträucher auf xylotomischer Grundlage. **[The identification of Central-European [native and introduced] dicotyledonous trees and shrubs by their wood anatomy.]** Verlag des Ungarischen Naturwissenschaftlichen Museums. 1945. pp. 183 + 2 tbls. + 254 plates. 31 refs. [G.] (*Naturwissenschaftliche Monographien* No. 1).

Presents detailed descriptions, micro-photographs, and drawings, of the xylem elements of 250 species, preceded by a brief general introduction to the technique of identification, a glossary of the terms used, and a key given in both German and English.

2736. BERGER, L. G. DEN. Determinatietabel voor houtsoorten van Malesië tot op familie en geslacht naar voor de loep (10× en 20×) zichtbare kenmerken. **[A key to the identification down to genera and species of**

Malayan timbers, using characteristics visible with a hand lens (10× and 20×).] *Publicatie, Fonds Landbouw Exportbureau 1916-1918, Wageningen* No. 34, 1949. pp. 82 + 1 tbl. 69 refs. [Du.]

2737. KISSER, J., and STURM, M. Mikroskopische Untersuchungen über den Verholzungsgrad und die Membrandichte der Holzelemente. **[Microscopic research on the degree of lignification and the density of the membrane of wood elements.]** *Mitt. öst. Ges. Holzforsch.* 1 (2), 1949 (10–6). 34 refs. [G.g.] P.R.

Metachromatic staining experiments on 4 softwoods and 10 diffuse-porous and 5 ring-porous hardwoods showed the differences in degree of lignification and density of structure of different elements of the wood. These differences are shown to be related to various wood properties. Swelling, which is caused by the reaction between the OH-groups of the cellulose chains and water, occurs less in highly lignified wood. The wood of *Tilia platyphyllos* is unusually subject to shrinkage and swelling, but since this occurs as much in the radial as in the tangential direction there is little distortion. *T. platyphyllos* was the least lignified of the woods examined and its rays, in contrast with the other species, were only very slightly lignified and offered little resistance to radial shrinkage. Other properties discussed are resistance to fungus attack shown by highly lignified woods and wood elements, and the effect of lignification on ease of impregnation.

2738. PRESTON, R. D. **Spiral structure and spiral growth. The development of spiral grain in conifers.** *Forestry* 23 (1), 1949 (48–55). 13 refs.

In the present paper an attempt is made to carry the explanation of spiral grain in conifers a little farther than has hitherto proved possible. If an elongated cell, covered by a spirally organized cell wall, is increasing in length, then, provided no external agency intervenes, the cell will twist around its longitudinal axis through an angle calculable in terms of the pitch of the spiral and the elastic constants of the spiral winding. It follows that if the cell is laid against a rough surface it will tend to "roll" around a line normal to the surface and passing through the geometrical centre of the cell. It is suggested that this is what happens in the cambium of conifers showing spiral grain, and it is shown that the theory gives a relation between the angle of tilt of the grain and the length changes in the cambium, of the type observed by Misra. The theoretical line can be fitted to the observed values by the assumption of a value of n/q which is not unreasonable in view of the structure of cambial cell walls. Some consideration is given to the factors which may lead, in terms of this theory, to the development of excessive spiral grain. *Author's summary.*

2739. WARDROP, A. B. **Micellar organisation in primary cell walls.** *Nature, Lond.* 164 (4165), 1949 (366). 8 refs.

In recent X-ray investigations upon the cell-wall organization of conifer cambium, it was observed that much of the diffuse radiation tending to mask the diffraction diagram of the cellulose could be eliminated by a preliminary extraction of the tissue with pectic solvents or with dilute acid. In more recent work, using pellets of cambium from *Pinus sylvestris*, it has been observed that the average micelle breadth is 18Å. in the unextracted tissue and 26Å. after extraction. This apparent change in micelle size, taken in conjunction with the appearance of additional diffraction rings upon extraction, would seem to indicate a considerable increase in the crystallinity of the specimen as a result of the extraction treatment. The manner in which this change could have taken place is discussed. [Cf. *For. Abstr.* 10 (No. 2610; 11 (No. 1083).]

2740. PRESTON, R. D., and WARDROP, A. B. **The fine structure of the wall of the conifer tracheid. IV. Dimensional relationships in the outer layer of the secondary wall.** *Repr.* from *Biochimica et Biophysica Acta, New York and Amsterdam* 3, 1949 (585–92). 14 refs. [E.e.f.g.] [Department of Botany, University of Leeds.] P.R.

Cf. *For. Abstr.* 11 (No. 319).

2741. HODGE, A. J., and WARDROP, A. B. **An electron-microscopic investigation of the cell-wall organisation of conifer tracheids.** *Nature, Lond.* 165 (4190), 1950 (272–3). 15 refs. [C.S.I.R.O., Melbourne.]

In this investigation, the micellar orientation of the cellulose was established for the inner layer of the secondary wall of tracheids of

Pseudotsuga taxifolia by the use of the electron microscope.

2742. SCHOCH-BODMER, H., and HUBER, P. Spitzenwachstum und Gabelbildung bei sekundären Fasern. **[Tip growth and forking of secondary [wood] fibres.]** *Schweiz. Z. Forstw.* 100 (12), 1949 (551–67). 24 refs. [G.g.f.]

The authors first review the three main theories on the formation of wood fibres by the cambium cells (sliding, symplastic and intrusive growth respectively) and give their reasons for adopting the theory of intrusive growth. Observations on the xylem of *Sparmannia africana*, particularly the occurrence of forked fibres with forking at the level of the end of the cambium cell from which the fibre grows out, appear to confirm this view.

2743. BISSET, I. J. W., DADSWELL, H. E., and AMOS, G. L. **Changes in fibre-length within one growth ring of certain Angiosperms.** *Nature, Lond.* 165 (4192), 1950 (348–9). 9 refs. [Division of Forest Products, C.S.I.R.O., Melbourne.]

Recently, in an investigation of the wood of *Eucalyptus gigantea*, it was found that latewood fibres were *ca.* 60% longer than earlywood fibres of the same growth ring and that the fibre-length variation followed a characteristic pattern through the various growth rings. Similar variations were observed in other Eucalypts which also have distinct growth rings indicative of temperate conditions, viz. *E. regnans*, *E. dalrympleana*, and *E. pauciflora* but in those Eucalypts without definite growth rings, such as *E. deglupta* from New Guinea, there was no significant variation. In the case of *E. gigantea*, the fibre-length variation has been directly correlated with growth rate. It has been shown that the shortest fibres from the first-formed earlywood of the growth ring are coincident with the maximum growth of early spring, and the longest fibres from the last-formed latewood with the minimum growth of early winter; the increased fibre length of the latewood is accommodated by a greater overlap of the fibres.

A preliminary survey has now been made of fibre-length variation within one growth zone of various Angiosperm timbers:—*Castanea sativa*, *Quercus robur*, *Fraxinus excelsior*, *Ulmus campestris*, *Cedrela toona*, *Tectona grandis*, *Fagus sylvatica* and *Populus tremuloides*—all with distinct growth rings; and *Castanea javanica*, *Eucalyptus deglupta*, *E. grandis* and *Lithocarpus perclusa*, without distinct growth rings. Results are tabulated and agree with those already discussed, and the same general trend apparently exists also in Gymnosperms.

2744. BOUREAU, E. Sur l'évolution de la ponctuation araucarienne dans les bois vivants et fossiles. **[The evolution of [bordered] pits of the *Araucaria* type in living and fossil woods.]** *Bull. Soc. bot. France* 96 (4/6), 1949 (94–7). [F.] O.B.D.

2745. DOYLE, M. H., and DOYLE, J. **Pith structure in conifers. I. Taxodiaceae.** *Proceedings of the Royal Irish Academy, Dublin* 52B (2), 1948 (15–39 + 1 plate). 10 refs. L.S.

Pith structure shows considerable variation and is a reliable diagnostic feature. An identification table based on pith characteristics is presented. *From Authors' summary.*

2746. HOLWILL, P. J. A. **Occurrence of medullary bundles in the Apple shoot.** *Nature, Lond.* 165 (4187), 1950 (156–7). 3 refs.

Medullary bundles are known to occur in some 38 families of flowering plants, but hitherto they have not been reported in the Rosaceae. The author of the letter has been investigating their occurrence in shoots of the Apple (var. Worcester Permain on Malling II stock). No connexion was found, as in certain other families, between the medullary bundles and the vascular cylinder. In a transverse section of the stem a few nodes from the apex, the bundles are seen to consist of a central phloem surrounded by radially arranged rows of cells which will ultimately become lignified and which probably originated from a cambium. It appears that formation is not continuous throughout the growing season, so that isolated groups of bundles occur at intervals throughout the length of the shoot, separated from those above and below by normal pith. In order to determine whether there was any difference in the occurrence of medullary bundles in trees growing on different stocks, shoots growing on Malling XVI and Malling IX root stocks were investigated. No bundles have so far been discovered in Worcester Permain growing on the former, which is a vigorous stock, but only on the dwarfing Malling IX stock.

2747. Ho, T.-H. **Anatomy of the wood of *Manglietia moto* Dandy, with special reference to its vessel members.** *Bot. Bull. Acad. sinica* 3 (3), 1949 (126–33). 32 refs.

A new type of vessel member is described, having perforated "septum-like" membranes. Methods of sampling and measuring various woody elements are reviewed, and the method adopted for the study of *Manglietia moto* is presented in detail.

31.2. *Physical Properties*

See also *For. Abstr.* 11 (Nos. 2585, 3038).

2748. KOLLMANN, F. Neuere Ergebnisse der physikalischen und mechanisch-technologischen Holzforschung. **[Recent results of research on the physical, mechanical, and technological properties of wood.]** *Schweiz. Z. Forstw.* 101 (2/3), 1950 (73–94). [G.f.]

31.21. Conductivity

See also *For. Abstr.* 11 (No. 3136).

2749. GRUZELLE, R. Quelques isolants thermiques. **[Some thermal insulating materials.]** *Revue générale du Froid, Paris* 26 (3), 1949 (217–9). [F.] D.S.I.R.

The physical and working properties and the uses of a selection of materials, including Balsa and wood pulp, were tested and discussed. The strength, hygroscopicity, non-conductivity of heat, and resistance to fire and to attack by insects and fungi, were sufficiently good for the use of all materials as insulators in refrigeration.

2750. TEESDALE, L. V. **Thermal insulation made of wood-base materials.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1740, 1949. pp. 40 + 8 photos, 13 dgms., 3 gphs., 8 tbls., 2 maps. 27 refs. P.R.

A comprehensive account, including sections on the relation of climate to insulation, the calculation of insulation requirements, thermal properties of materials, application of insulating materials during building construction and in existing buildings, fuel saving, condensation, ventilation, air humidity, the risk of fire and its control.

31.22. Relation to Water, Air, Gases

See also *For. Abstr.* 11 (Nos. 2737, 2758–9, 2928, 2930–2, 2993–4).

2751. SCHEFFER, T. C., and TORGESON, O. W. **Humidifying apparatus for small test rooms.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1752, 1949. pp. 2 + 2 dgms. P.R.

Describes a small hygrostat originally devised for use in an experimental seasoning kiln, and now in use in rooms used at Madison for accelerated testing of the resistance of wood to decay by cultures of wood-destroying fungi.

2752. NEUBRECH, W. L. **Wood and relative humidity.** *American Artisan, Chicago* 117 (3; 4; 5), 1949 (88–9, 218, 220, 222; 92–4; 83–6, 196). D.S.I.R.

Discusses the general theory of the relationship between moisture and wood, gives figures for the humidity of the air in different parts of the U.S.A., and the moisture of wood in relation to air humidity, and discusses the damage to plaster, structural timber fittings, furniture etc., caused by variations in humidity.

2753. KADITA, S., and NAKATO, K. **Influences of some extracting treatments on the hygroscopicity of wood.** *Wood Res., Kyoto* No. 2, 1949 (9–21). 12 refs. [Jap.e.] P.R.

Sawdust of Hinoki (*Chamaecyparis obtusa*) and Buna (*Fagus crenata*) was treated with different liquids, and its hygroscopicity compared with that of untreated sawdust. The following results were obtained: (1) extraction with benzene alcohol increased hygroscopicity; (2) hygroscopicity is decreased by extraction with cold and to a somewhat greater extent with hot water; (3) extraction with 1% NaOH increased the hygroscopicity considerably, the difference in moisture content between treated and untreated samples being 2·8% for Hinoki and 3·8% for Buna; and (4) treatment with Schulze's maceration liquid increased hygroscopicity, giving an equilibrium moisture content of 34–35% at 20° C. and a relative humidity of 100%. A sample of solid Hinoki (8×8×8 mm.) similarly treated, had a maximum power of absorption similar to that of sawdust, but its hygroscopicity at low humidities was lower than that of sawdust. Veneers of Hinoki and

Buna had a higher maximum absorption capacity, and a similar hygroscopicity at low humidities to that of sawdust. *From authors' summary.*

2754. BUTTNER, E. E. **Strange hygroscopic behaviour of some timbers.** *S. Afr. Timb. Tr. J.* 3 (10), 1949 (12–5).

Gives examples of variations in the hygroscopic behaviour in different specimens of Conella [*Canella* spp.] and Silky Oak [*Cardwellia sublimis*]. The specimens had not the same density or specific gravity (the samples probably coming from different parts of the tree) and the variations may be due to a time lag in the reaction of the more porous samples. Under extreme weather conditions behaviour was more uniform.

2755. NAYER, A. N., and HOSSFELD, R. L. **Hydrogen bonding and the swelling of wood in various organic liquids.** *J. Amer. chem. Soc.* 71 (8), 1949 (2852–5). 14 refs. [Division of Forestry, University of Minnesota.] O.R.S.

A study was made of the swelling of *Acer saccharum* in a variety of organic liquids including several homologous series of amines. The behaviour of the wood is explained by the hypothesis that the degree of swelling bears a direct relationship to the intensity of H bonding between the constituents of wood and the swelling agent, and that steric hindrance is a controlling influence on the intensity of this bonding.

2756. HIROTA, K. **Impregnation of Manchurian White Birch with electrolyte solution. I. Impregnation of wetted wood with alkali salt solution. II. Impregnation with alkaline earth solution.** *Journal of the Society of Chemical Industry of Japan, Tokyo* 47, 1944 (428–30). *Chem. Abstr.* 42 (17), 1948 (6529). P.R.

I. White Birch was saturated with water and treated with an alkali salt solution. The diffusion constants are tabulated. The lower the molecular weight, the greater is the impregnation. The mechanism of impregnation is the complex mutual reaction of ions. The rate of impregnation increases with temperature. II. Impregnation is due to diffusion. An increase in the concentration of impregnating solution increases impregnation.

31.23. Weight. Specific Gravity

2757. **[Specific gravity of *Pinus patula* grown in New Zealand.]** *Rep. N.Z. For. Serv. 1948–9*, 1949 (35).

The average basic specific gravity for four 37-year-old trees from Whakerewarewa was 0·386 (co-dominants 0·402; suppressed 0·370). Material from three 16-year-old trees from Kaingaroa contained no heartwood and had a mean specific gravity of 0·336. [Cf. *For. Abstr.* 11 (No. 1868).]

2758. **[Shrinkage and specific gravity of New Zealand plantation-grown *Pinus radiata*.]** *Rep. N.Z. For. Serv. 1948–9*, 1949 (35).

Material for this study came mostly from one compartment of 23-year-old trees in Kaingaroa Forest. Mean basic specific gravity for 36 trees was 0·373; individual means for the several crown classes were:—dominant, 0·367; co-dominant, 0·363; intermediate, 0·383; suppressed, 0·386.

It has been shown that the presence of low-density corewood in *P. radiata* is not necessarily indicative of high longitudinal shrinkage, which occurs especially in butt logs of dominant and co-dominant trees, whereas low-density corewood is met with at all heights in these crown classes. It is found only in top logs in intermediate and suppressed trees. [Cf. *For. Abstr.* 11 (No. 1868).]

2759. **[Variation in specific gravity of New Zealand Beeches.]** *Rep. N.Z. For. Serv. 1948–9*, 1949 (34–5).

An extensive survey of variation in specific gravity and shrinkage of the New Zealand Beeches has been initiated and the following interim conclusions are drawn:—(1) In general, North Island Silver Beech [*Nothofagus menziesii*] is of high density. (2) Samples from Nelson conservancy, however, suggest that light-weight Silver Beech timber may not be limited to Southland. (3) Red Beech [*N. fusca*] tends to decrease in density from North to South. (4) Samples from small Mountain Beech [*N. cliffortioides*] from montane forests gave specific gravity figures lower than those determined for the low-altitude, large trees of western Southland (average 0·498). Very high shrinkages occurring in some test material were indicative of the refractory nature of the

heartwood, which tends to "collapse" in seasoning.

31.25. Hardness. Resistance to Abrasion

See also *For. Abstr.* 11 (No. 2765).

2760. YOUNGQUIST, W. G., and MUNTHE, B. P. **The abrasive resistance of wood as determined with the U.S. Navy wear-test machine.** [*Publ.*] *U.S. For. Prod. Lab., Madison* No. *DO*–67, 1949. pp. 8 + 1 photo, 2 dgms., 23 gphs., 2 tbls. P.R.

Results of tests with the machine, which is described, on 15 species, place the species in about the order to be expected from actual experience. The much greater wear resistance of end-grain surfaces is clearly indicated for all species. No clear uniform relationship between wear resistance and specific gravity was found *From authors' summary.*

2761. ARMSTRONG, F. H. **Flooring softwoods: their wear and anatomical structure.** *Bull. For. Prod. Res., Lond.* No. 23, 1949. pp. 4 + 7 photos.

[Cf. *For. Abstr.* 10 (No. 279).] An analysis of the surface wear and breakdown of softwood flooring under light to moderately heavy pedestrian traffic is illustrated by photomicrographs of the principal species. The important factor for behaviour under abrasion is the density of constituent tissues. The breakdown of conifers of the north temperate zone is much influenced by the difference in density of spring- and summer-wood; the initial compression of the tracheids of the former is followed by disintegration and rupture, and the characteristic ridging or serrated appearance of the rift-sawn and the 'shelling-out' of wood tissue of the flat-sawn stock. Proportion of summerwood is of greater importance than ring width. If it is small, as with softwoods of the south temperate zone, there is no significant difference in density, and more uniform compression gives more even wear. The method of conversion is an important factor with the north-temperate-zone conifers, rift-sawn material possessing better wearing qualities than flat-sawn; it is relatively unimportant with softwoods of the south temperate and tropical regions, where growth rings are indistinct. *From author's summary.*

31.27. Mechanical Strength

See also *For. Abstr.* 11 (Nos. 2914, 2926–7, 2930, 2933–4, 2941, 3037–9, 3121, 3127, 3131, 3139–40, 3209 et seq.).

2762. COLLIER, R. D. **The application of SR-4 strain gauges in woods operations in Eastern Canada.** *Woodl. Res. Index Pulp Pap. Res. Inst. Can.* No. 75 (*B*–1), 1950. pp. 11. 14 refs.

Applications of this device to logging operations were suggested in a previous publication [cf. *For. Abstr.* 11 (No. 338)]. The present paper describes the technique in detail and gives results of some experiments in its use on holding booms, pulpwood towing rafts, and pulpwood loading cranes. Recommendations for further investigations are made.

2763. COOPER, K. L. **Some general aspects of timber testing.** [*Proceedings of the*] *First* [*F.A.O.*] *Conference on Mechanical Wood Technology, Geneva* 1949 (7–9, 40–52). 33 refs. [Division of Forest Products, South Melbourne.]

A review of international practice in mechanical tests, covering purpose of tests, selection of material, test conditions (moisture content, temperature and relative humidity), speed of testing, accuracy of measurement, and presentation of data, with recommendations and discussion. Cf. *For. Abstr.* 10 (No. 2620).

2764. KÜHNE, H. **Tension test parallel to grain: survey on the technical problems and the possibilities of general standardization [with discussion].** [*Proceedings of the*] *First* [*F.A.O.*] *Conference on Mechanical Wood Technology, Geneva* 1949 (9–10, 53–8 + 9 dgms.). 10 refs. [Federal Laboratory for Testing Materials and Research Station for Industry, Building Construction and Craft, Zürich.]

Recommendations are made on methods of test, size and shape of specimen, and information to be recorded.

2765. BIENFAIT, J. L. **Group 2 tests (tension perpendicular to grain, compression perpendicular to grain, cleavage and hardness).** [*Proceedings of the*] *First* [*F.A.O.*] *Conference on Mechanical Wood Technology, Geneva* 1949 (11–5, 63–7 + 3 dgms.). 2 refs. [Forest Products Research

Laboratory, Institute for Testing Materials, Delft.]

Methods of testing tension and compression perpendicular to the grain and cleavage are discussed, and the Janka and Monnin methods of testing for hardness, and 7 examples of apparatus used at different laboratories for testing for abrasion, are described.

2766. **[Strength of Mountain Beech (*Nothofagus cliffortioides*).]** *Rep. N.Z. For. Serv. 1948–9*, 1949 (33).

Tentative results for all the bolts from one tree of this species are:—modulus of rupture (lb./sq. in.) 8,600, modulus of elasticity (lb./sq. in.) 1,300,000, toughness (inch-pounds) 172. In all these properties, and also in density, *N. cliffortioides* is intermediate between *N. fusca* and *N. menziesii*.

2767. **[Strength of White Manuka (*Leptospermum ericoides*).]** *Rep. N.Z. For. Serv. 1948–9*, 1949 (34).

Tests on a batch of White Manuka specimens gave an average toughness value of 245 inch-pounds for air-dry material with a density of 59 lb./cu. ft. This timber is not equal to Hickory for high-quality handles, but it appears to be superior to Spotted Gum and American and European Ash in toughness.

2768. HECK, G. E. **A tone test for Hickory.** *Sth. Lumberm.* 179 (2249), 1949 (268, 270).

To sort stiff and resilient from 'rubbery' Hickory at the Forest Products Laboratory, Madison, a stick of the wood is dropped on to a concrete floor. High-quality wood gives a clear, ringing sound, poor-quality wood, a low note or a dull thud. A comparison of sorting by such results with evidence from physical and mechanical tests showed the method to be fairly reliable.

31.3. *Chemical Properties*

See also *For. Abstr.* 11 (Nos. 2753, 2800, 2805–6, 2814–5, 2982 et seq., 3010 et seq., 3115–20).

2769. BRISSAUD, L. **[A method for the] determination of pentosans in plant materials and in pulp.** *Mémoires des Services Chimiques de l'État, Paris* 33, 1947 (75–82). *Chem. Abstr.* 43 (18), 1949 (7227–8). P.R.

2770. WISE, L. E., GREEN, J. W., and RITTENHOUSE, R. C. **Paper partition chromatography of simple sugars as applied to pulp hydrolyzates and other related substances.** *Tappi* 32 (7), 1949 (335–6). 7 refs. [Institute of Paper Chemistry, Appleton, Wis.] L.S.

The method is described and its limitations are discussed. The following results were obtained from experiments: (1) the hydrolysates of Iles mannane, a beater additive, showed the presence of mannose and glucose; (2) the hydrolysate of a polysaccharide extracted from Black Spruce was shown to consist principally of galactose and arabinose, the former predominating, (3) the prehydrolysates of Aspen showed only xylose distinctly, those from Spruce yielded galactose, mannose and xylose; (4) a complete hydrolysis of Spruce wood and its holocellulose yielded largely glucose, with much smaller amounts of xylose and mannose; (5) Slash Pine wood and its holocellulose gave results similar to Spruce; and (6) the skin-like substance obtained as an insoluble residue by the treatment of coniferous pulp fibres with cuprammonium hydroxide gave on hydrolysis predominantly mannose, with small amounts of glucose.

2771. BLAND, D. E. **Separation of vanillin and syringaldehyde [from hardwood lignins] by paper partition chromatography.** *Nature, Lond.* 164 (4182), 1949 (1093). 4 refs. [Division of Forest Products, Commonwealth Scientific and Industrial Research Organization, South Melbourne.]

Experiments were made on the woods of *Eucalyptus resinifera* and *E. diversicolor*.

2772. ABADIE, F. A. Note sur la coloration du bois en vert sous l'action des acides et sur son rapport avec la liaison lignine cellulose. **[The green colour produced in wood by treatment with acids, and its relation to the lignin-cellulose complex.]** *Norsk Skogind.* 3 (11), 1949 (290–4). 11 refs. [F.Nor.e.] [Norwegian Pulp and Paper Research Institute.] P.R.

The literature on the colour reaction of wood with acids is reviewed. The green coloration is attributed to the reaction of the acid with a lignin/carbohydrate complex; no colour reaction is observed with free lignin or free carbohydrate. The reaction is obtained in

both hardwoods and softwoods, but in the former it passes rapidly, lasting only a few seconds; in softwoods it lasts for several hours. The colour obtained in softwoods is an emerald and in hardwoods an olive green. Results of experiments are tabulated to show the colour reaction and the content of lignin and of materials insoluble in acetone after nitration, in Spruce wood, and at different stages of semichemical sulphite cooks of Spruce. They show that the colour reaction has no relationship to the quantity of lignin present. Generally speaking, semichemical sulphite pulps containing more than 15–20% acetone-insolubles turn green when treated with acid, those containing less than 15% turn olive green, and those containing no acetone-insolubles turn brown. Semichemical soda pulps turn brown at all stages of the cook and at contents of acetone-insolubles ranging from 27·6 to 0%.

2773. Brauns, F. E. **The physical properties of lignin.** *Tappi* 32 (4), 1949 (157–60). [Institute of Paper Chemistry, Appleton, Wis.] L.S.

A review of experimental evidence of the physical properties (solubility, ageing, heat of combustion, colour, density, viscosity, molecular weight, sorption capacity, optical activity and fluorescence) of isolated lignins and lignin derivatives. There is evidence that these lignins have been changed physically during isolation, and many of the properties vary with the method of isolation.

2774. Aulin-Erdtman, G. **Ultra-violet spectroscopy of lignin and lignin derivatives.** *Tappi* 32 (4), 1949 (160–6). 18 refs. [Swedish Wood Research Institute, Stockholm.] L.S.

A review of literature on the use of ultra-violet spectroscopy to determine the effect of different methods of isolation on the original wood lignin, to prove the aromatic structure of lignin in wood and to check theoretical and chemical data on lignin structure.

2775. Jones, E. J. **The ultra-violet absorption spectra of complex hydroxy-aromatic compounds and derivatives, with particular reference to lignin.** *Tappi* 32 (7), 1949 (311–5). 26 refs. L.S.

2776. Wacek, A. Einige neuere Beiträge zur Ligninchemie. **[Some new contributions to the chemistry of lignin.]** *Mitt. öst. Ges. Holzforsch.* 1 (3), 1949 (10–3). 16 refs. [G.] [Die technische Hochschule in Graz.] P.R.

A review.

2777. Good, A. L., and Polya, J. B. **Extraction of lignin by acetonitrile.** *Australian Chemical Institute Journal and Proceedings* 16 (5), 1949 (180–4). 11 refs. [Chemistry Department, Univesity of Tasmania.] L.S.

2778. Adler, E., and Ellmer, L. Coniferaldehydgruppen im Holz und in isolierten Ligninpräparaten. **[Coniferaldehyde groups in wood and in isolated lignin preparations.]** *Acta Chemica Scandinavica, Copenhagen* 2, 1948 (839–40). 7 refs. [G.] O.R.S.

2779. Gottlieb, S., and Geller, J. H. **Enzymatic decomposition of lignin.** *Science* 110 (2851), 1949 (189–90). 15 refs. [University of Maryland.] O.R.S.

Preliminary report of studies on a lignin-oxidizing enzyme prepared from commercial mushroom spawn. The absorption of O, measured in a Warburg manometric apparatus, was used as an indication of enzyme activity. When 1 ml. of an aqueous solution containing 3 mg. of enzyme, buffered to pH 6·0, is incubated with 1 ml. of an aqueous lignin suspension containing 30 mg. lignin/ml., 75 cu.mm. of O are absorbed in the first hour.

2780. Hachihama, Y., and Jodai, S. **Catalytic hydrogenation of lignin. IV. Catalytic hydrogenation of softwood lignin. V. Phenolic fraction of the catalytic hydrogenation products of softwood lignins.** *Journal of the Society of Chemical Industry, Japan* 45, 1942 (302–7). *Chem. Abstr.* 43 (21), 1949 (8674–5). P.R.

Cf. *For. Abstr.* 11 (Nos. 1115–6).

2781. Hachihama, Y., Jodai, S., Takeda, M., Sawai, K., and Nakayama, M. **Catalytic hydrogenation of lignin. X. Hydrogenation decomposition of 'Ezomatsu' wood. XI. Hydrogenation of 'Buna' wood and bagasse.** *Journal of the Society of Chemical Industry, Japan* 47, 1944 (215–20). *Chem. Abstr.* 43 (21), 1949 (8675). P.R.

X: Hydrolignin and various cyclohexanol derivatives were obtained as decomposition products of lignin, from Ezomatsu wood flour submitted to hydrogenation. XI: Buna wood and bagasse flours, on hydrogenation, were

completely lignified and yielded pale yellow transparent alkaline solutions. As the temperature was low, a low-degree polymerized lignin was obtained.

2782. HACHIHAMA, Y., and JODAI, S. **Catalytic hydrogenation of lignin. XII. Fundamental constituent of lignin.** *Journal of the Society of Chemical Industry, Japan* 47, 1944 (763–5). *Chem. Abstr.* 43 (21), 1949 (8675). P.R.

From the products of the hydrogenation decomposition of lignin, it is deduced that the fundamental constituents of lignin are substances of the type (*a*) 4-propylguiacol, (*b*) 2,6-dimethoxy-4-propylphenol, and (*c*) *p*-propylphenol. Coniferous, deciduous and grass lignins consist of (*a*), (*a*) + (*b*), and (*a*) + (*b*) + (*c*) respectively.

2783. JODAI, S. **Catalytic hydrogenation of lignin. XIII. Composition of hydrolignin of Yezomatsu wood. The molecular formula of hydrolignin of Yezomatsu wood. XIV. Oxidation of hydrolignin of Yezomatsu wood. XV. Mechanism of hydrogenation decomposition of lignin and the generation of hydrolignin.** *Journal of the Society of Chemical Industry, Japan* 47, 1944 (958–64). *Chem. Abstr.* 43 (21), 1949 (8675). P.R.

XIII: The molecular formula of hydrolignin obtained from sawdust of Yezomatsu [*Picea ajanensis*] wood corresponds to $C_{20}H_{24}O_7$; it contains 2 MeO groups, 2 phenolic OH groups, 2 alcoholic OH groups, and 1 aldehyde group. XIV: By the oxidation of hydrolignin of Yezomatsu wood, it was shown that the hydrolignin contains the guiacol nucleus. XV: When lignin is hydrogenated above 250°, only compounds containing a chain of 3 C atoms bound to a C_6 ring are obtained; hydrolignin is obtained only when lignin is hydrogenated at 215°. From this and other evidence it is concluded that with softwood the hydrogenation of lignin proceeds: lignin; hydrolignin; propylguiacol (catalyst NiO); 4 propylcyclohexanol or 4 propylhexanediol (Raney Ni catalyst).

2784. ENKVIST, T., MOILANEN, M., and ALFREDSSON, B. Studien über die Ausbeute und die Reaktionsgeschwindigkeit bei der Bildung von Schwefellignin aus Fichtenholz. [**Studies on the yield and rate of reaction of the production of sulphur lignin from Spruce.**] *Svensk PappTidn.* 52 (21), 1949 (517–25). 15 refs. [G.e.sw.] [Svenska Träforskningsinstitutet, Trätekniska Avdelningen.] P.R.

The yield of sulphur lignin is not increased by the use of increased amounts of H_2S in aqueous solution, by beating the wood in a colloid mill, by prehydrolysis with alkalis and acids, or by treatment with other reagents. Substantially better yields are obtained if the time of the reaction is prolonged or the temperature increased. When Spruce is cooked with a solution of H_2S in water or 60% alcohol, the yield of sulphur lignin increases with the alkalinity up to pH 8·5. Microscopic investigations in ultra-violet light show that the lignin from cooks of Spruce with H_2S at pH 7 and temperatures of above 100° C. melts and flows into the lumina of the cells, often finally filling them completely. *From authors' summary.*

2785. BERTRAND, G., and SILBERSTEIN, L. Action des solutions alcalines diluées sur le bois. [**Action of dilute alkaline solutions on wood.**] *Annales agronomiques* (*n.s.*), *Paris* 19 (5), 1949 (746–9). [F.] O.R.E.

Lists yields of acetic acid and methanol from the action of dilute hydroxides of Na, Ca and NH_4 on 8 hardwood and softwood species, and on straw. The liberation of acetic acid from the 4 conifers (*Picea abies*, *Larix decidua*, *Pinus pinaster* and *Abies alba*) and from the straw, was practically complete. In the case of the hardwoods (*Castanea sativa*, *Quercus robur* s.s., *Fagus sylvatica* and *Populus tremula*) it was considerably less. There appear to be two kinds of acetyl linkage in lignified tissue, (1) easily hydrolysable by weak, cold alkaline solutions, and (2) only completely resolved under the influence of a strong alkali. In gymnosperms and in straw, only (1) exists; in angiosperms (2) is found with a certain proportion of (1). Similar, but less marked differences exist also in the case of methanol.

2786. KLAUDITZ, W. Zellulosegehalt und chemische Zusammensetzung des Lichtungszuwachs-Holzes einer Rotbuche. [**Cellulose content and chemical composition of light-increment wood of Beech.**] *Holzforschung, Berlin* 3 (1), 1948 (1–5). 8 refs. [G.g.] P.R.

The Beech stem examined contained narrow-ringed wood (annual rings Nos. 1–47) with average annual ring width 1·8 mm., and light-increment wood (annual rings nos. 48–53) with average width 6·5 mm. and maximum width 8·9 mm. The light-increment wood contained few vessels and the cell walls of the sclerenchyma fibres were comparatively thick. The narrow-ringed wood was considerably richer in vessels and contained a higher proportion of rays than light-increment wood, but the number of vessels was smaller than in normal Beechwood. The dry weight of the light-increment wood was 0·83 g./cu. cm. as against 0·74 for the narrow-ringed and an average of 0·65 for normal Beech wood. The narrow-ringed wood contained a higher proportion of extractives, lignin and pentosan, and 2·31% less cellulose than the light-increment wood. Results are tabulated.

2787. AGGARWALA, J. C., and MCCARTHY, J. L. **Distribution of molecular weight in Bamboo celluloses.** *Journal of the Indian Chemical Society, Calcutta* 26 (1), 1949 (11–8). [University of Washington, Seattle.] O.R.S.

The average degrees of polymerization of cellulose from *Dendrocalamus strictus*, determined directly from the wood, and of 3 isolated celluloses, one from *D. strictus* and two from mixed Bamboo species, are 1,620, 1,350, 775 and 1,260 respectively. Unlike *Tsuga heterophylla* and *Picea mariana*, which consist largely of celluloses of high (above 2,000) and low (below 500) degrees of polymerization, nearly 65% of the celluloses of *D. strictus* are of intermediate degree of polymerization (500–2,000), 10% being lower and 26% higher. Celluloses isolated from the mixed species of Bamboos show complex molecular-weight distribution curves.

2788. FARMER, R. H., and CAMPBELL, W. G. **Isolation of a saponin from the heart-wood of the Mora tree [*Mora excelsa*] and of a related species, Morabukea [*M. gonggrijpii*].** *Nature, Lond.* 165 (4189), 1950 (237). 2 refs.

2789. GRIPENBERG, J. **The constituents of the [heart]wood of *Thuja occidentalis* L.** *Acta Chemica Scandinavica, Copenhagen* 3 (7), 1949 (782). 2 refs. [E.] [Finnish Institute of Technology, Helsinki.] O.R.S.

Yields of 0·08% α- and 0·008% γ-thujaplicin and traces of thujic acid were found; no β-thujaplicin could be detected but it may have been present in small amounts. The large proportion of α- and relatively small proportion of γ-thujaplicin present is remarkable in comparison with *T. plicata*, where they occur in approximately equal quantities; thujic acid, of which only traces occur in *T. occidentalis* is the main constituent of heartwood of *T. plicata*. [Cf. *For. Abstr.* 11 (No. 1129).]

2790. ANDERSON, A. B., and ERDTMAN, H. ***L*-arabinose from heartwood of Western Red Cedar (*Thuja plicata*).** *J. Amer. Chem. Soc.* 71 (8), 1949 (2927–8). 4 refs. O.R.S.

While investigating extractives from the heartwood of *T. plicata* a yield of 1·29 g. of a sugar melting at 151–153° C. was obtained from 470 g. of wood, and was identified as *l*-arabinose.

2791. LINDSTEDT, G. **Constituents of Pine heartwood. IX–XIII. The heartwood of *Pinus montana* Mill., *P. contorta* var. *latifolia* S. Wats., *P. radiata* D. Don, *P. ponderosa* Dougl., and *P. jeffreyi* Balf.** *Acta Chemica Scandinavica, Copenhagen* 3 (7), 1949 (755–72). 10 refs. [E.e.] [Kungl. Tekniska Högskolan, Stockholm.] O.R.S.

[Cf. *For. Abstr.* 6 (38); 8 (No. 1834).] The following constituents have been isolated from the heartwoods of: (1) *P. montana*—pinocembrin (5,7-dihydroxyflavanone), pinosylvin (3,5-dihydroxystilbene), and pinosylvin monomethyl ether; (2) *P. contorta* var. *latifolia*—*l*-arabinose, pinocembrin, pinosylvin and its monomethyl ether; (3) *P. radiata*—pinobanksin, pinocembrin, pinosylvin monomethyl ether and a small quantity of *l*-arabinose; (4) *P. ponderosa*—pinosylvin, its monomethyl ether, *l*-arabinose, and very small amounts of pinocembrin and pinobanksin; and (5) *P. jeffreyi*—*l*-arabinose, pinocembrin and pinosylvin monomethyl ether.

2792. WISE, L. E., and RITTENHOUSE, R. C. **The presence of arabinose units in Pine-wood and in kraft pulp.** *Tappi* 32 (9), 1949 (397–8). 13 refs. [Institute of Paper Chemistry, Appleton, Wis.] L.S.

Arabinose in small amounts has been found in the hydrolysates of the following: *Pinus lambertiana*, *P. monticola* and *P. virginiana*. Thus it is impossible to differentiate between

the '5-needle' and '2-needle' Pines on the basis of their arabinose contents. The hydrolysate of an unbleached Spruce sulphite pulp showed no trace of arabinose; that of an unbleached Jack Pine sulphate pulp yielded very small amounts of arabinose.

2793. KING, F. E., and ACHESON, R. M. **Afzelin (kæmpferol-3-rhamnoside), a new glycoside isolated from Doussié [*Afzelia* spp.]** *Prepr.* from *Journal of the Chemical Society, London* Jan., 1950 (168–70). [The University, Nottingham.] P.R.

2794. **[Resin content of *Pinus radiata*.]** *Rep. N.Z. For. Serv. 1948–9*, 1949 (37–8).

Work is in progress on the study of the resin content of the more important exotic Pine species, with reference to their pulping qualities. Material from the several crown classes of *P. radiata*, 20 or more years old, and cut at the butt, 4-in. top, and intermediate heights, was divided into sapwood, heartwood and intermediate zones for detailed examination. The following conclusions are drawn from the ether-soluble determinations:—(1) Resin content in suppressed trees is higher than in other crown classes; this is largely accounted for by the much higher heartwood content of such trees. (2) Seasonal-variation figures for butt sections show highest resin contents in the spring; for sections at 10 in. and 7 in. diam., highest in autumn to winter; and for sections at 6 in. and 4 in. diam., slightly higher in spring than in autumn. (3) Mean annual resin content for all crown classes is 1·6%, which is also the seasonal mean.

A few ether-soluble determinations have also been made on *P. patula*, whose low resin-content is of interest.

31.4. *Durability. Decomposition*

2795. [EYRE, H.] **Wood's wearing qualities.** *Timb. & Plyw.* 97 (2529), 1949 (1044, 1046). P.R.

Wear in wood can be classified as caused by: (1) animal life e.g. the rubbing away of piles by the marine gribble; (2) water—as in cooling towers where the dropping of water on wooden laths has an abrasive and dissolving action; (3) wind-blown sand; and (4) other mechanical friction. Examples of different types of wear are described. The texture, hardness, quality, and condition of the wood, the method of conversion, and the use of a filler in the cell cavities to support the zones of weakness, are all factors affecting the rate of wear.

31.42. Attack by Plant Organisms

See also *For. Abstr.* 11 (Nos. 2737, 2751, 2779, 2811, 2847–50, 3015–7, 3058 et seq.).

2796. FALCK, R. Podstawy fizjologiczne rozwoju grzybni *Vasomella maeandrata* oraz innych gatunków z rodziny Ceratostomellaceae. **[Fundamentals of the physiological development of the mycelium of *Vasomella maeandrata* and of other Ceratostomellaceae.]** Podstawy zabezpieczenia drewna użytkowego w związku z fizjologicznym charakterem rozwoju grzybni i przeznaczeniem drewna. **[Fundamentals of timber protection, according to the nature of the attack and the use to which the timber is put.]** *Rozpr. Sprawozd. Inst. Bad. Leśn.* No. 59, 1949. pp. 59. [Pol.russ.e.]

A condensed account of the author's unfinished researches of 1936–9 at the State Forest Research Institute, Poland, based on his surviving records. A full account is to be printed.

2797. FINDLAY, W. P. K. **Staining of wood by fungi.** *Timber News* 58 (2128), 1950 (74–5). [Forest Products Research Laboratory, Princes Risborough.]

2798. FINDLAY, W. P. K. **Decay of wood by fungi.** *Timber News* 58 (2127), 1950 (26–7). [Forest Products Research Laboratory, Princes Risborough.]

2799. **Decay of timber in buildings.** For. Prod. Res. Lond. 1950. pp. 2. P.R.

The cause, recognition, treatment and prevention of dry rot and, more briefly, of 'wet rot' (e.g. *Coniophora cerebella*).

2800. SCHEFFER, T. C., and HOPP, H. **Decay resistance of Black Locust heartwood.** *Tech. Bull. U.S. Dep. Agric.* No. 984, 1949. pp. 37. 19 refs. Price 15*c*.

Tests were made on samples from 48 trees of *Robinia pseudoacacia* of different sizes; 30 trees were from the Shipmast and Flowerfield vegetatively propagated strains, and the other 12 (common Locust) were seed-bearing trees

showing marked variation in growth forms. The fungi used in the tests were *Fomes rimosus*, a heart-rot fungus commonly found in Locust trees and posts, and *Poria incrassata*. On the average, the Flowerfield strain decayed least, Shipmast rather more, and common Locust considerably more. There was little variation in decay within the Shipmast and Flowerfield strains, but a marked variation in the common Locust. Within a single tree, decay resistance decreased from outer heartwood to pith, and the decay resistance of the outer heartwood decreased and that of the inner heartwood increased from the base of the tree upwards. The outer heartwood at the base showed the greatest and the inner heartwood at the base the least resistance. The average resistance of the entire heartwood cross-section was generally greater in the lower part of the trunk especially in small trees. Large trees were more resistant in the outer, small trees in the inner heartwood. With trees of equal diameter, the slower-grown ones were slightly more resistant. In general, wood having more rings per inch or lower specific gravity was more resistant, and yellow wood more resistant than brown; these indications are not, however, altogether reliable for judging decay resistance. The belief that Locust cut in spring is less resistant than that cut in winter was not confirmed. Decay resistance was found to be partly associated with hot-water extractives; both the extractives and decay resistance were most evident when the heartwood was first formed, decreasing as new layers of heartwood were added to the outside. Test methods are suggested for comparing trees for genetical superiority in decay resistance.

2801. COSTA, E. W. B. DA. **The decay resistance of Australian timbers.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 175, 1949 (1–2).

The main Australian timbers are classified under the headings: very durable; durable; moderately durable; and non-durable. The classification is intended to indicate the expected service life of timbers used out of doors, in contact with the soil, and takes into account both decay and termite resistance. It is based on heartwood only. Variations in resistance within species and in a single tree are discussed, and field and laboratory test methods are described.

2802. BOYCE, J. S., JR. **The effect of some physical sterilizing methods on the natural decay resistance of small wood blocks in laboratory tests.** *Abstr.* of thesis, in *J. For.* 48 (1), 1950 (10).

There were no differences in decay resistance of small blocks of Sitka Spruce and Douglas Fir sterilized by:—(1) passing through an open gas flame several times without charring, (2) oven heating, (3) dipping in boiling water, and (4) autoclaving. Blocks of *Taxodium distichum*, because they contained internal contaminants, permitted a rating of effectiveness of the different treatments: (2) was a more thorough sterilizing treatment than (3), but only (4) would have permitted the use of this material in pure-culture evaluations.

2803. GRAHAM, R. W. **A technique for culturing wood-rotting fungi.** *Abstr.* in *Journal of the Colorado-Wyoming Academy of Science, Boulder* 3 (5), 1948 (58). L.S.

In studies of the efficiency of fence-post preservatives a technique was evolved whereby an abundant source of inoculum could be produced rapidly for soil inoculations. Sterilized White Pine matchsticks were placed upright in a malt agar medium contained in a deep Petri dish. The pathogen was transferred to the agar and rapidly affected the matches, which were then used as inoculum.

2804. **[Media for obtaining rapid decay of wood blocks in culture.]** *Rep. Mines For. sci. Serv. Br. Can. 1947–8*, 1949 (62).

Soil was found to be a satisfactory medium in which to obtain rapid decay of wood blocks in culture, but the blocks may be so stained by the soil that the true colours of the rots do not appear. Vermiculite was tested as a substitute for soil, in the hope that the rots produced might be more characteristic. Blocks of White Pine buried in soil, and in vermiculite, and inoculated with 4 fungi, were examined after 6 months' incubation at 78–80° F. The wood was only slightly discoloured by vermiculite, but was badly stained by soil. Loss in weight due to decay was 62–71% in soil and 5–35% in vermiculite. The 4 fungi were about equally active on the blocks in soil, but showed very considerable variation in their attack on blocks in vermiculite. The effect of an extract of vermiculite on the growth of 2 of the fungi was tested in plate culture. The spread of the fungi over the plates was not checked, but

reduced vitality was evidenced by a thinning of the mats.

2805. LUTHARDT, W. Das ausgelaugte Holz aus der künstlichen Zucht holzbewohnender Pilze. **[Leached wood from the artificial cultivation of wood-rotting fungi.]** *Holzforschung, Berlin* 3 (4), 1949 (117–21). [G.] P.R.

Various uses are proposed for wood after its use for fungus cultivation, and it is suggested that the use of different fungi might leave a wood residue consisting entirely of lignin or of cellulose. Figures are given for the specific gravity, solubility in water and 1% NaOH, and chemical composition of Beech wood after attack by *Pholiota mutabilis* for periods ranging from ½ to 3½ years. No experimental details are given. Results indicate that the fungus does not attack lignin or cellulose selectively, but the initial slight rise in cellulose content perhaps suggests that other polysaccharides are attacked first. The steady increase in the % of pentosan present, from 24·7 initially to 28·6% after 3½ years suggests that pentoses are resistant to biological attack. Examples of growth of fungi on wood after inoculation by the author's method (not described) are illustrated by photographs. The author offers free samples of wood to those interested.

2806. FÅHRAEUS, G., NILSSON, R., and NILSSON, G. **Studies in the decomposition of wood by means of some white rot fungi.** *Svensk bot. Tidskr.* 43 (2/3), 1949 (343–56). 20 refs. [E.] O.B.D.

The growth of *Polyporus abietinus*, *Stereum rugosum* and *Marasmius scorodonius* on Birch sawdust was investigated. Sawdust inoculated with these fungi was analysed after 2, 3, 4 and 6 months. Determinations were made of residual dry material, cellulose, lignin and the water-soluble substances formed. *P. abietinus* and *M. scorodonius* attack lignin more intensely than cellulose, whereas *S. rugosum* attacks cellulose preferably although the lignin is also much decomposed. A very high % of the material was consumed after 6 months of attack. Determinations of cellulose by extracting sawdust direct with Schweizer's reagent showed that this component could only partly be dissolved from the fresh sawdust, but much more easily from wood decomposed by *P. abietinus* and *M. scorodonius*. *From authors' summary.*

2807. VILLEY, M. Rôle de l'eau du substrat sur le développement du *Coriolus versicolor* (L.) Quél. (= *Polyporus versicolor*). **[The function of the moisture content of the substratum in the development of *C. versicolor*.]** *Comptes rendus des Séances de la Société de Biologie et de ses Filiales, Paris* 142 (11/12), 1948 (718–20). [F.] I.I.E.

A study of the growth of *C.* [*Polystictus*] *versicolor* on Beech specimens and sawdust at varying moisture contents.

31.43. Attack by Animal Organisms

See also *For. Abstr.* 11 (Nos. 2848–54, 3064 et seq.).

2808. FISHER, R. C. **Household timber insects: recognition, prevention and control of infestation.** *Repr.* from *Sanitarian, London* Nov., 1949. pp. 24. [Forest Products Research Laboratory, Princes Risborough.]

2809. JACQUIOT. De l'emploi du chauffage par haute fréquence pour la destruction des insectes des bois mis en oeuvre. **[The use of radio-frequency heating for the destruction of insects in woodwork.]** *C.R. Acad. Agric. France* 36 (15), 1949 (637). [F.] A.P.B.

Successful experiments were made at the Laboratoire Central d'Essais des Bois in destroying larvae of *Hylotrupes bajulus* in structural timbers, woodwork and furniture, by means of radio-frequency heating. For wood less than 30 mm. thick, 700 watts were sufficient to kill larvae in 30 seconds. For wood 15 cm. thick, 5 KW for 5 min. were lethal.

2810. BECKER, G. Beobachtungen über Erholung von Scheintodlähmungen durch Kontaktgifte bei Cerambyciden. **[Recovery of Cerambycidae from paralysis induced by contact poisons.]** *Anz. Schädlingsk.* 23 (1), 1950 (1–2). 18 refs. [G.]

Recovery from paralysis and apparent death caused by four insecticides, γ-hexachlorocyclohexane, DDT, E605f and M410 (a preparation similar to Chlordane) respectively, was observed in several individuals of *Hylotrupes bajulus*.

2811. HOGAN, T. W. **Pin-hole borers of fire-killed Mountain Ash. The biology of the pin-hole borer—*Platypus subgranosus* S.** *Journal of the Department of Agriculture,*

Victoria, Melbourne 46 (8), 1948 (373–6, 377–80). 3 refs. H.S.B.

Notes on the life-history of the beetle, methods of rearing it under artificial conditions, transmission of the ambrosia fungus, and the identity of some natural enemies. *From author's summary.*

2812. SCHMIDT, H. Termiten: Biologie, Schädlichkeit, Vorbeugungs- und Bekämpfungsmassnahmen. **[Termites: their biology and harmfulness, and methods of prevention and control.]** *Merkbl. ZentInst. Forst- u. Holzw.* (*Ser.* 2) No. 10, 1949. pp. 15. 22 refs. [G.e.] P.R.

31.46. Injury by Atmospheric Agencies, Water, etc.

See *For. Abstr.* 11
(Nos. 2752, 2929, 2934, 2950).

31.8. *Quality and Defects of Timber*

See also *For. Abstr.* 11
(Nos. 2845, 2911, 3127, 3245).

2813. HARTMANN, F. Das statische Wuchsgesetz bei Nadel- und Laubbäumen: neue Erkenntnis über Ursache, Gesetzmässigkeit und Sinn des Reaktionholzes. **[The statical law of growth in conifers and hardwoods: new knowledge on the cause, conformity to natural laws, and significance of reaction wood.]** Springer-Verlag, Vienna. 1942. pp. 111. Many refs. [G.g.] [Hochschule für Bodenkultur, Vienna.]

Describes in detail, and with copious illustrations, a selection of the numerous experiments and studies made by the author over a period of 20 years on the formation (distribution and amount) of reaction wood under the influence of artificial and natural shoot bending in different planes and directions, during the replacement of lost leaders by laterals, and (for conifers only) under the influence of centrifugal force. The experiments cover leader-type, naturally vertical shoots, and lateral shoots growing obliquely upwards or downwards. Some are also concerned with forms having naturally obliquely-growing stems.

The results contradict theories attributing the formation of reaction wood, and the growth responses concerned, to the action of geotropism, plagiotropism, epinasty, or mechanical stressing. A clear correlation is, however, found between reaction-wood formation and the degree of deviation of a shoot from its intrinsic growth direction (*innere Wuchsrichtung*), and this reaction system obeys the laws of statical equilibrium. A shoot in its intrinsic growth direction forms no reaction wood and is in stable equilibrium. If a shoot is moved vertically from its point of stable equilibrium across the horizontal to make the same angle with it on the other side, it forms no reaction wood and is considered to be in a state of unstable equilibrium. If a shoot is caused to occupy any other position, reaction wood is formed and is disposed in a manner such that the shoot tends to regain its intrinsic growth direction. The intensity of the reaction is a function of the deviation of the shoot from that direction. If the intrinsic growth direction is changed, e.g. by the shoot correlation mechanism whereby a lateral replaces a lost leader, there is a corresponding change in the statical equilibrium, and the reaction wood formed will now tend to bring the shoot into its new intrinsic growth direction.

The stimulus causing reaction-wood formation proceeds from the shoot apex and is conducted, downwards only, in the phloem. This downward direction is maintained if the stimulus (growth substance) passes from a branch into the main stem. Reaction wood is formed only when for any reason the shoot apex is brought out of its intrinsic growth direction or when the intrinsic growth direction is changed. It appears that plants of erect growth tend to dispose their organs in that position which best resists the force of mass acceleration, whether in the gravitational field of the earth or e.g. in a centrifuge. The intrinsic growth direction of an organ seems to depend—apart from its polarity and symmetry—chiefly on the genetically conditioned behaviour of the plant as regards mass acceleration and shoot growth correlations.

2814. DADSWELL, H. E., and WARDROP, A. B. **What is reaction wood?** *Aust. For.* 13 (1), 1949 (22–3 + 8 photos). 26 refs.

In this paper an attempt has been made to answer for the forester and the timber user the question embodied in the title. The information available in the literature and in the

laboratory records of the Division of Forest Products, on the compression wood of Gymnosperms and the tension wood of Angiosperms, has been summarized with particular reference to macroscopic appearance, micro structure, chemical composition and properties. In each case a comparison with normal wood has been made. The occurrence of both these types of reaction wood has been discussed and attention directed to possible factors involved in their formation in the living tree. *Authors' summary.*

2815. ONAKA, F. **Studies on compression- and tension-wood.** *Wood Res., Kyoto* No. 1, 1949. pp. 88. 87 refs. [Jap.e.] P.R.

The formation, through eccentric growth, of compression wood in conifers and of tension wood in deciduous trees is discussed. Treatment of Pine, Spruce and conifers with indole-3-acetic acid or naphthalene acetic acid caused the development of compression wood and bending when applied only to one side of the shoots. Auxin was found in leaning stems of conifers in greater quantity in the lower side. It is concluded that the direct cause of the formation of compression wood is the accumulation of auxin. The anatomical differences in compression wood as shown in the tracheids, cell wall, wood parenchyma and vertical resin ducts, rays and bark, and in tension wood in the fibres, vessels, wood parenchyma, rays and bark, are described. The presence of a gelatinous layer in the cell wall is the most characteristic feature of tension wood and occurs in 3 main forms: (1) as the innermost layer only of the cell wall in a few genera, e.g. *Pyrus, Cornus, Stewartia, Ligustrum, Osmanthus*; (2) occupying the whole of the secondary wall, found chiefly in the fibre tracheids of Myricaceae, Trochodendraceae, Cercidiphyllaceae, Hamamelidaceae, Cornaceae, Oleaceae, and Ternstroemiaceae; (3) forming a special inner layer in the secondary wall, found in libriform fibres of Salicaceae, Ulmaceae, Moraceae, Lauraceae, Anacardiaceae, Aceraceae, Rhamnaceae, etc. In some genera, e.g. *Ilex, Euonymus, Rhododendron, Pieris*, and *Xolisma*, eccentric growth occurs without the formation of a gelatinous layer, and in Tiliaceae, Malvaceae, Sterculiaceae, and Daphneaceae, a different type of tissue modification is found. Some species, mostly shrubs, show no tendency to eccentric growth, and in a few cases, e.g. *Gardenia, Buxus*, the eccentric growth resembles that of conifers. The tracheid wall of compression wood is shown to be strongly lignified in all layers, and there is a relatively high proportion of lignin present. Tension wood may contain a lower quantity of lignin, varying with the proportion of gelatinous material present. The differences between compression, tension, and normal wood in physical properties (colour, specific gravity, water content, hygroscopicity, permeability, shrinkage, strength and working properties) are listed.

2816. DOUDA, V. Studie o významu reakčního dřeva pro strom. Vliv růstových činitelů na tvorbu reakčního dřeva a vhodné jeho upotřebení v praxi. [**Studies on the importance of compression wood for the tree. The influence of growth factors in producing compression wood and its suitability for various uses.**] *Sborn. čsl. Akad. zeměd.* 20 (2/3), 1948 (189–202). Numerous refs. [Cz.e.russ.] C.G.B.

Studies climatic and other factors influencing the growth of trees and the formation of compression wood. Compression wood, owing to its durability, is suitable for use in cooperage, for flooring, paving-blocks, and sleepers; it is also a good fuel. *From author's summary.*

2817. KITAZAWA, G. **Non-destructive testing of wood by X-rays.** *Sth. Lumberm.* 179 (2249), 1949 (170–1).

Preliminary notes on research being made by the Timber Engineering Co. in co-operation with the X-ray Division of Westinghouse Electric Corporation, into the development of a rapid, non-destructive test for wood which would reveal hidden defects. One deterrent to more widespread use of X-rays is the cost and time of preparing X-ray photographs. A disadvantage of fluoroscopy has been the low screen brightness. An image amplifier is being developed, however, by which the original image is intensified on a second screen.

2818. HACKS, J. Ein Gerät zum Aufsuchen von Eisenstücken in Baümen. [**An instrument for detecting pieces of iron in trees.**] *Zeitschrift für angewandte Physik, Heidelberg* 1 (1), 1948 (11–9). 6 refs. [G.g.] [Laboratorium für Technische Physik der Technischen Hochschule, München.] P.O.

Using the electro-magnetic instrument described, it is possible to judge accurately the size and depth of the metal object. The instrument will detect very small iron objects at a distance of 5·5 cm. and a 2-cm. fragment at 20–30 cm. [Cf. *For. Abstr.* 8 (Nos. 1879–81), 9 (Nos. 351–2); 11 (No. 410).]

32. HARVESTING OF WOOD. LOGGING

See also *For. Abstr.* 11 (Nos. 2762, 2965, 3002–5, 3227, 3358).

2819. SIMMONS, F. C. **Harvesting the forest crop in the Northeast and Lake States.** *Lumberm.* 76 (10), 1949 (66, 68).

A short review of equipment and methods used in this region.

2820. COLLETT, M. H. **Harvesting the forest crop in southern U.S.A.** *Lumberm.* 76 (10), 1949 (68).

A short review of equipment and methods used in this region.

2821. BRIEGLEB, P. A. **Applied forest management in the Douglas Fir region.** *B.C. Lumberm.* 33 (11), 1949 (76,78, 80, 132).

Practical recommendations for logging in this region.

2822. MATSON, E. E. **Recent logging improvements in the Pacific Northwest.** *Lumberm.* 76 (10), 1949 (94–6).

A short review of equipment and methods used in this region.

2823. GRANT, J. E. **Salvage logging and forestry problems on the Elsie Block of the Tillamook Burn.** *For. Cl. Quart.* 23 (1), 1949/50 (3–6, 22–4 + 1 photo).

Mainly an account of logging methods and equipment used by the Crown Zellerbach Corporation in clearing this area of fire-killed trees preparatory to replanting.

2824. Les conditions d'utilisation du matériel d'exploitation forestière et de scierie dans les pays tropicaux de l'Union française. **[Conditions for the use of logging and sawmilling equipment in the tropical territories of the French Union.]** *Bois For. Trop.* No. 12, 1949 (407–28). [F.e.]

This study presents the conclusions of an inquiry made among lumbermen and timber manufacturers of the French tropical territories, in order to ascertain the characteristics of logging and sawmill equipment entirely suited to their needs.

Caterpillar tractors should be 90–140 h.p. and there is an increasing tendency to use them for skidding tree-length logs which are then cross-cut at the truck-loading yard, preferably by motor chain-saws. Tyred tractors with 4 driving wheels give good results, which might be improved if they were supplied with arches similar to the caterpillar arches but provided with tyres for running on roads. In sawmills, all efforts should be made to improve the means of handling logs on the saw-bench and to increase the output by a reduction of lost time in sawing.

2825. L'exposition pour l'équipement de l'Union française. **[The exhibition of French machinery.]** *Bois For. Trop.* No. 12, 1949 (372–92). [F.]

Describes (with illustrations) some of the machinery, notably tractors, winches, loaders, lorries, and power saws, shown at the exhibition held in Paris in connexion with the Conference organized by Sté. des Ingénieurs pour la France d'Outre-Mer, in Oct. 1949.

2826. VIL'KE, G. A. **New 60 kw mobile electric power plant for lumbering.** *Transl. For. Prod. Aust.* 1949. pp. 10. Transl. by M. Slade from *Lesn. Prom.* 1948 (8), (4–6). [*For. Abstr.* 10 (No. 2649).] P.R.

2827. MOROZOV, A. V. Parovaya peredvizhnaya elektrostantsiya moshchnost'yu 40 KVT. **[A steam-driven mobile 40-kw generating station.]** *Lesn. Prom.* 1949 (8), (12–13). [Russ.]

Gives a general account, with photographs, of this generating station, which is housed in a narrow-gauge railway wagon, the whole having a total weight of *ca.* 16 metric tons and a maximum speed of 10 km./hr. When in use at a given site, the wagon rests on the ground, supported by 8 'outrigger' jacks. Its steam engine, 2-cylinder and developing 60 h.p., drives a synchronous 3-phase, 40 KW (50 KVA) generator producing current of 380 and 230 volts and 50 cycles.

2828. ERAKHTIN, YA. D. Peredvizhnŷe elektrostantsii—na gazogeneratornoe toplivo. **[Mobile power stations [converted to operate] on gas generator fuel.]** *Lesn. Prom.* 1949 (10), (14–15). [Russ.]

Deals briefly with the conversion of 11 mobile generating stations at the Syavsk Lespromkhoz from petrol to producer-gas operation, using various gas-generator types (chiefly the NATI–G–14), with some details of the methods of mounting.

2829. PATSIORA, P. P., and LARIN, V. T. Elektrogenerator povyshennoy chastotŷ tipa ChS7 dlya lesozagotovok. [**An increased-frequency [200 cycles/sec.] power generator of the ChS7 type for logging operations.**] *Lesn. Prom.* 1949 (12), (6–7). [Russ.]

A detailed description, with illustrations and tables of characteristics. The generator has a power of 14 KVA and works at 1,500 revs./min., putting out 3-phase current at 240 volts and 33·7 amperes. The exciter is a selenium-rectifier type. Tested in PES–12/200 mobile power plants in the forest, this generator proved capable of feeding 7–8 TsNIIME K–5 power saws on intensive work. It can be fitted as a supplementary generator to the PES–40, –50 and –60 mobile power stations.

2830. GYARKIN, E. Ruchka dlya perenoski stal'nŷkh kanatov. [**A handle for carrying wire rope.**] *Lesn. Prom.* 1949 (8), (14). [Russ.]

Very briefly describes, with a diagram, a self-locking metal handle for lifting and carrying frayed wire rope.

2831. POPOV, G. D. Vosstanovitel'nŷ remont stal'nŷkh kanatov. [**Renovation of wire ropes.**] *Lesn. Prom.* 1949 (9), (19–22). [Russ.]

2832. ELFMAN, N. O. Några skogsarbetstekniskt betydelsefulla drag hos vinterklimatet i Norrland och Dalarna. [**Some features of the winter climate of Norrland and Dalecarlia that are of importance to forest work.**] *Norrlands SkogsvFörb. Tidskr.* 1948 (2), (153–84). 24 refs. [Sw.sw.]

This study, based on official meteorological reports for the period 1920–40, examines some questions of temperature and snow conditions that are of interest in Swedish winter logging. A well frozen foundation is essential for good going on extraction roads; hence special interest attaches to the state of the ground just before snow cover is established. The data used showed wide variations in the period of ground frost before the establishment of snow cover. Local climates of the continental character are clearly more favourable in this respect than maritime ones. Studies of the dates when the temperature drops below 0° C. in autumn and rises above that value in spring, and of the dates at which lasting snow cover is established, are reported in some detail, the findings being illustrated by maps and graphs. The importance of further studies in this field is urged.

2833. LEHMUSLUOTO, P. A. Havaintoja vanerikoivun hakkuussa, ajossa ja uittossa sattuneista tapaturmista. [**Observations on accidents occurring during the cutting, transport and floating of veneer Birch.**] *Metsät. Aikak.* 1949 (1), (31–2). [Fi.]

Comparative statistics are given of accidents occurring during the various stages of cutting, transporting and floating veneer Birch, and in forest and floating work generally. The proportion of accidents during the cutting of veneer Birch is comparatively small owing to the work's being done when the ground is free from snow. About one-third of the accidents occur during short-distance transport, owing to the use of horses, the difficulty of collecting the timber, and the weight of Birch. The difficulty of handling is also reflected in the high proportion of accidents during the floating. Damage caused by tools in dealing with veneer Birch (16·0%) is far below the average for all logging and floating work (31·0%). Rolling and falling logs are responsible for a fairly large proportion of accidents, both in the case of veneer Birch (17·0%) and of all logging work (17·4%). Injuries sustained during the cutting, transporting and floating of Birch are of a graver sort than average. Wounds are less frequent than in general logging work, but crushing occurs more often and broken bones constitute a large category. Improvements in working methods would reduce the danger of accidents.

32.2. *Felling and Related Operations*

32.24. Felling Season

See *For. Abst.* 11 (No. 3017).

32.25. Felling and Initial Conversion

See also *For. Abstr.* 11 (Nos. 2691, 2872).

2834. HERRGEN, A., and CARON, M. **Time and motion study—a tool of woodlands**

research. *Woodl. Res. Index Pulp Pap. Res. Inst. Can.* No. 76 (H–1), 1950. pp. 8 + 1 tbl.

Discusses technique and usefulness of time studies of woods operations.

2835. AZLETSKI, V. A. Shiroko rasprostranit' metodȳ elektropil'shchika N. N. Krivtsova. **[Power-sawyer N. N. Krivtsov's methods should be widely used.]** *Lesn. Prom.* 1949 (6), (4–7). [Russ.]

Describes, with diagrams, methods devised by this Stalin prize-winner for the rationalization of logging work with power saws, under conditions of either mechanized or unmechanized extraction. Details are given of the gangs used and the jobs allotted to the various workers. The main feature of the several schemes described—all of which gave outputs considerably higher than average—is that the power-sawyer and his mate concentrate on felling and cross-cutting on one strip of forest at a time, while, on another strip near by, the remaining workers are engaged in either preparations for felling or else trimming logs, piling and burning slash, and stacking or loading. But after felling enough trees on one strip for the remaining workers to carry on with trimming etc., the sawyer and his mate leave their saw and go to the second strip, where a second saw is waiting ready for felling to proceed. After felling sufficient on this strip, the sawyer and his mate go back to the first one, to cross-cut the stems which have by this time been trimmed, unless whole tree-lengths are being skidded out for cross-cutting centrally, in which case the sawyers carry on with felling. The sawyers thus move to another strip or to a fresh portion of the same strip after completing each phase of their work; the remaining workers may continue on the same strip or may move to another, according to the organization of their work.

2836. MILLER, M. S. Potochnȳ metod lesozagotovok v Timiryazevskom opȳtno-pokazatel'nom lespromkhoze. **[A 'continuous-flow' logging method in the Timiryazev Experimental and Demonstration Forest.]** *Lesn. Prom.* 1949 (7), (4–6). [Russ.]

Description, with diagrams, of two variants of a 'continuous-flow' method for logging with power saws, giving details of the general conditions of the operations concerned, the make-up of the logging gangs, the organization of work, and arrangements for accountancy and payment of the workers. Wages are calculated on a gang basis, and in the author's view it is impracticable to calculate them on an individual basis when, as in this case, the machines are served by teams of workers. [Cf. *For. Abstr.* 11 (No. 1140).

2837. ZIMMERMAN, K.-G. Organisationen av motorsågarnas användning: några erfarenheter från fällning med tvåmanssåg i Mellan-Sverige. **[The organization of work with power saws: some experiences of felling in Central Sweden with two-man power saws.]** *Norrlands SkogsvFörb. Tidskr.* 1948 (4), (394–416). [Sw.e.] (*Medd. fran Föreningen Skogsarbetens och Kungl. Domänstyrelsens Arbetsstudieavdelning* (*S.D.A.*) No. 33.)

[Cf. *For. Abstr.* 11 (Nos. 1148, 1921).] A lecture detailing the author's conclusions from practice on this problem, the importance of which is illustrated by the fact that of the cost of felling with such saws, about 65% represents wages. (1) The areas selected should be large enough and of a suitable nature to provide sufficient work. (2) The density and average volume of the marked trees should be high, e.g. *ca.*100 trees/ha. with a minimum d.b.h. of 10 in. over bark. (3) Logging areas should be not far apart, so as to reduce time spent in transporting the saw. (4) The operations should be as concentrated as possible in time. In view of (2), this restricts the use of power saws to timber fellings, which in the author's district are done from January to April, the pulpwood being felled out manually beforehand. (5) Operators must be carefully selected not only for their mechanical knowledge but also for organizing capacity, steadiness and responsibility. (6) The saw team should consist of two full-time sawyers, and all ancillary operations, e.g. removal of snow and undercutting, should be done by the ordinary loggers. (7) Great attention should be paid to the training of the sawyers, and special courses are advisable. (8) Besides an annual overhaul, the power-saw equipment should be serviced daily. (9) The supply of spare parts must be well organized. (10) Transport arrangements for the saws and operators must be worked out to suit local conditions. (11) Job instructions, which must be clear and brief, should be given both orally and in written form. (12) Wages are at present fixed by combined time and piece rates, the

time rate guaranteeing a minimum income and the piece rate serving as an incentive.

2838. Berger, T. Redskapsentraler. **[Central workshops for tool maintenance.]** *Tidsskr. Skogbr.* 56 (9), 1948 (223–9). 1 ref. [Nor.]

Describes, and illustrates with photographs and a plan of the building, a saw-filing workshop set up by Romedal Almenning in Sept. 1947, on the same general lines as that at Åsele in Sweden [see *For. Abstr.* 9 (No. 2302)]. The mechanical equipment consisted of a 3-h.p. electric motor, shafting, 2 emery wheels and 2 grindstones. Lighting was provided by 4 neon lamps (40-watt) and a separate adjustable lamp at each workplace. Apart from a few odd jobs on badly worn axes and bark spuds, only saws were dealt with as a matter of course. Three filers maintained a weekly saw service for 132 logging workers, dealing in all with 264 saws (workers' own saws plus reserve saws provided by the management) at an average rate of 8–9 saws/filer/day. That this performance was lower than at Åsele is due partly to the weekly instead of 4-daily service, and partly to the smaller staff, who had to check in and dispatch saws as well as doctor them. There was no transport problem, since the loggers were taken by lorry to work on Monday and brought back on Saturday and so the specially boxed saws could easily be taken on the same vehicles. The experiment is regarded as satisfactory, and not one complaint was received from the loggers using the saws. Through some fluctuation in the number of men at work in the forest, there was not always enough work for 3 filers, and at such times the spare man occupied his time in making bunks for cabins, snow-ploughs etc. This situation is often likely to arise at a central workshop, and in planning them enough working room should be allowed for alternative occupations.

2839. Forstgerechtes Baumfällen: ein Bildlehrbuch der Gesellschaft für forstliche Arbeitswissenschaft e.V. **[Correct tree-felling practice in forestry: a pictorial textbook of the Gesellschaft für forstliche Arbeitswissenschaft e.V.]** M. & H. Schaper, Hannover. 1946. pp. 80. 16 refs. [G.]

Instructional matter on technique, designed for woodcutters and foresters and based on 20 years' experience by 'Gefa'. Includes a section on felling with power saws.

2840. Parfenov, G. M. Spilivat' derev'ya zapodlitso s zemley. **[Cut trees flush with the ground.]** *Lesn. Prom.* 1949 (8), (10–11). [Russ.]

Under present felling rules, the height of stumps of trees 30 cm. d.b.h. and over must not exceed ⅓ of the diameter of the section, and those of smaller trees must not exceed 10 cm., measured from the root collar. The author presents the results of a time study comparing, for d.b.h.'s of 22–36 cm., felling times for trees cut with and without stumps and indicating the gain in volume for the latter, using power saws in both cases. Cutting with no stumps involved 40 extra man-seconds per tree for trees of 22 cm. d.b.h., increasing to 95 for those of 36 cm. d.b.h., but the gains in log volume varied respectively from 1·79 to 3·10%, which is regarded as quite sufficient to justify cutting flush with the ground. The trial was made in snow 52 cm. deep.

2841. Ullén, G. Några skogliga arbetsstudier. **[Some forest work studies.]** *Norrlands SkogsvFörb. Tidskr.* 1948 (2), (185–217). [Sw.sw.]

Gives an account of time studies of trimming and cross-cutting work made in Kolleberga and Herrevadskloster Crown Parks, Skåne, in 1946 and 1947, with special reference to studies of trimming of Norway Spruce and Scots Pine tree-length logs felled in advance of the studies. For 148 Spruce stems with a mean butt diameter of 25·6 cm. the trimming times per m. of length, for dead and live branches respectively, were 0·42 and 0·76 min. For 47 Scots Pine stems with a mean butt diameter of 27·6 cm. the corresponding times were 0·40 and 0·82 min. These times, however, varied greatly in different portions of the stem, and near the junction of the live and the dead portion of the crown there was practically no difference in trimming times for live and dead branches. Trimming time per stem depends primarily upon number and size of branches. Branch size is proportional to the quotient of d.b.h. and age, and number of branches proportional to age and the length of stem bearing branches. For trees of uniform d.b.h. the trimming time per unit of volume is less for long than for short stems. The height/d.b.h. ratio appears to be a suitable expression of relative height for such studies.

2842. Shubin, M. S. Merka dlya raskryazhevki khlÿstov. [**A measuring rule for the cross-cutting of logs.**] *Lesn. Prom.* 1949 (8), (14). [Russ.]

A 1-m. wooden rule, 5 × 3 cm., with 1-cm. graduations for measuring off accurate log lengths (or diameters), iron-shod at each end and with sharpened projections to the 'shoes', for scribing the logs. On the face are given the lengths of the commonest assortments.

2843. [**Chemical treatment of trees to facilitate barking.**] *Rep. N.Z. For. Serv. 1948–9*, 1949 (35).

Interim results are reported from chemical poisoning experiments designed to retain the easy-barking characteristics of spring and early summer fellings, by killing the trees during these seasons. Sodium arsenite as a flour paste was applied after ring-barking. Trees of European Larch felled 4 months after treatment were barked more easily than the controls. Less favourable results were obtained with Corsican Pine; parts of many trees remained green, and the killed parts were affected by sapstain and insect attack.

32.29. Clearance of Felling Site. Stump Removal. Slash Disposal

See also *For. Abstr.* 11 (Nos. 2642, 3258–9).

2844. Groome, E. S. **Brush disposal.** *Pulp Paper Mag. Can.* 50 (13), 1949 (132, 134). [Iroquois Falls Division, Abitibi Power and Paper Co. Ltd.]

Presents briefly the results of experiments in different methods of brush and slash disposal after logging. During the operations 50% of the natural regeneration was destroyed. Cost statistics show that the cheapest method was to employ 2 crews, one for logging and one for slash disposal.

32.8. *Grading and Storage of Wood in the Rough*

See also *For. Abstr.* 11 (Nos. 3017, 3067–8, 3372).

2845. Lehonkoski, N. A. Vanerikoivujemme nykyinen laatu. [**Contemporary quality of veneer Birch.**] *Metsät. Aikak.* 1949 (1), (16–9). [Fi.]

Sketches the growth of the plywood industry in Finland, from the first year of export in 1912 to the present day. With increasing demand (between 1920 and 1937 exports increased 13-fold) the quality of the raw material has steadily deteriorated, as illustrated by figures for the Lake Päijänne area. The Central Birch Bureau distinguishes 3 classes of Birch, the specifications of which are tabulated. Plywood sheets have six classes, the 3 highest totalling only 3·8% of the current outturn. The specifications of each are given. Legislation to compel (private) forest owners to take proper care of their Birch stands may be the only solution for improving the quality of the raw material.

2846. 32.82 : 33.06. Coville, S. B. **Piling 'sled-length' firewood.** *Fox For. Notes N.H. For. Dep.* No. 42, 1949. pp. 1.

2847. Compte rendu des essais de protection de billons incendiés contre le bleuissement par l'emploi du Xylophene 10E. [**Report on tests of the protection of fire-killed logs against blue-stain by the use of Xylophene 10E.**] *Bois & Résin.* No. 1519, 1950 (1). [F.]

Spraying with a 10% solution of Xylophene 10E immediately after felling, barking, and cross-cutting, gave 90% protection against blue-stain to fire-killed logs, not yet attacked. A smaller experiment on unbarked logs gave 100% protection. Consumption of spray was at the rate of 5 l./cu.m.

2848. Jacquiot, C. La protection des bois en grumes sur le parterre des coupes et sur chantier. [**The protection of logs [against fungus and insect attack] on the felling site and in the sawmill.**] *Rev. int. Bois* 16 (149), 1949 (195, 197, 199). [F.]

Recommends spraying with an oily emulsion of pentachlorophenol, which acts both as fungicide and insecticide.

2849. Jacquiot, C. Note relative à la préservation des bois de Pin Maritime dans les régions incendiées des Landes. [**Notes on the preservation of timber in the fire-damaged regions of the Landes.**] *Rev. Bois Appl.* 4 (11), 1949 (34–5). [F.]

Recommendations for physical and chemical treatment of timber where immediate felling and conversion is impossible, with a list of French suppliers of pentachlorophenol and nitrophenol preservatives.

2850. **Prevention of deterioration in stored southern hardwood logs.** Sth. For. Exp. Sta. 1949. pp. 26. P.R.

Losses can be prevented by:—milling within 1 or 2 weeks after felling in summer or within 3 months in winter; storing submerged in water as soon as possible after felling; or treating with chemicals (e.g. pentachlorophenol, fuel oil and 666) and coating the ends with a gloss oil containing fillers to prevent checking; a fungicide, such as cresylic acid, may be added to the oil.

2851. BROWNE, F. G. **Tests of preservatives against ambrosia beetles in Malaya.** *Malay. Forester* 12 (4), 1949 (174–89).

A series of small-scale field tests of various insecticides, repellents etc., in Malaya, for the prevention of ambrosia-beetle attack on newly felled timber, is described. Pentachlorophenol (5%), 'Santobrite' (2%), a proprietary pentachlorophenol preservative, di-methyl phthalate, and DDT (14%) were ineffective, though it is possible that di-methyl phthalate may have had a repellent action for a week or more. Coal-tar creosote and Solignum proved highly attractive to ambrosia beetles, which bred successfully in the treated logs. 'E605' gave inconclusive results, but it is evident that only a strong concentration might be effective, and it would be both unpleasant and dangerous to use.

Benzene hexachloride ('gammexane') was tested in the form of γ-isomer oil concentrates and a water-miscible powder. With the former, some degree of protection was sometimes obtained with isomer concentrations of 1·75% and upwards, but the minimum concentration for full and reliable protection for a period of 2 months, apparently lies between 3 and 3·5%. The water-miscible powder is probably lethal to all ambrosia beetles for at least 2 months even at a γ-isomer concentration as low as 0·65%, but it is easily washed off by rain. It is suggested that the greater efficacy, apart from wash-off, of the powder, may be due to the presence of other isomers of benzene hexachloride.

Three main causes of obscure or misleading data have been found in these tests. They are:—(1) The main swarms of ambrosia beetles may arrive from one direction only. This results in a high degree of variation in intensity of attack and, consequently a large standard error. The phenomenon can, however, be very easily detected as a gradient in intensity, and the data interpreted accordingly. (2) Infestation of all the test material may be so light that no definite conclusions can be drawn. There is nothing for it, in such cases, but to repeat the test. Because of this possibility, too, it is advisable not to include too many logs in one test; nine is about the maximum advisable. (3) Attack on the treated logs may occur, but fail for obscure reasons, possibly unconnected with the preservative. This is usually accompanied by similar failure in one or more of the control logs, but careful examination and interpretation are necessary and it is usually advisable to repeat the test.

2852. BROWNE, F. G. **Notes on the cost of control measures against ambrosia beetles in Malaya.** *Malay. Forester* 12 (4), 1949 (208–11).

The author develops and discusses two formulae:—$C = \cdot 01\ WL$, where C = the maximum permissible cost of the control measures, W = the % of worminess of the class of timber under consideration and L = the financial loss that is incurred in the absence of control measures; and $w = \frac{c}{\cdot 01\ L}$, where w = the minimum degree of worminess that can be economically controlled, and c = the actual cost per ton of the control measures, and L has the same value as above.

2853. JOHNSTON, H. R., and KOWAL, R. J. **New insecticides for the prevention of attack by ambrosia beetles on logs and lumber.** *Sth. Lumberm.* 179 (2249), 1949 (183–8). [U.S. Bureau of Entomology and Plant Quarantine.]

Presents data from tests made in 1946–8 in co-operation with lumber manufacturers in Louisiana, Mississippi and Alabama, to find adequate methods of protecting Red Gum [*Liquidambar styraciflua*] logs by spraying, and small Red Gum bolts or freshly sawn material by spraying or dipping. 666 dissolved in fuel oil gave a high degree of protection to green logs for 3–4 months. When combined with 2% of pentachlorophenol, the solution effectively prevented sap stain. Emulsions and concentrated oil solutions of 666 showed promising results, but have not yet been fully tested. Results with DDT oil solutions were

erratic. Toxaphene, chlordane, monochloronaphthalene, dichlorodiphenyloxide, piperonyl butoxide, and piperonyl cyclonene gave no effective protection to the logs. For the protection of green lumber, water emulsions and water suspensions of both 666 and DDT were effective, but the former are more economical. Either material can be combined with sap-stain preventives. A concentrated solution of 666 in benzene, applied in the form of a fog spray, gave good results in limited tests.

2854. **[Spraying with DDT against borer attack.]** *Rep. Me. For. Comm. 1947–8*, 1949 (94–5).

Three stacks of Pine logs on different sites were thoroughly sprayed with a 12% DDT solution by means of a mist blower. The treatment seemed ineffective.

32.9. *Transport*

See also *For. Abstr.* 11 (Nos. 3229–37).

32.91. Land Transport

2855. Madas, M., and Iby, G. A gépesítes irányai az erdögazdaságban. **[Mechanization trends in forestry.]** *Erdész. Lap.* 85 (3), 1949 (64–8). [Hu.f.e.g.]

Four main types of lorry are used at present in Hungary for forestry purposes:—

	Average ton/km. per month	*Average cost per ton/km.*
		(*florins*)
3-ton Rába . .	4,400	1·30
4-ton GMC . .	4,400	1·58
5-ton Büssing . .	5,900	0·95
10-ton Diamant .	8,400	0·90

None is entirely satisfactory; owing to the war, production has not got going on the right lines. The 4-ton GMC, though the most costly to run, has advantages as a three-axled vehicle on very rough ground. The cheapest, the 10-ton Diamant, has drawbacks—heavy petrol consumption, excessive weight unloaded (total weight loaded is 20 metric tons). The 3-ton Rába is too light, besides being costly to run. The most satisfactory is the 5-ton diesel-engined lorry with trailer. This can get to almost any timber pile in Hungary.

The Tátra factory is experimenting with a 10-ton, three-axled vehicle powered with a V-12 diesel motor. Factory trials so far show a petrol consumption of 40 l./100 km., and a cost likely to work out at 0·6 florins per ton/km. Since it is not possible to continue importing the 5-ton Bussing-NAG lorry, arrangements are in hand to acquire the home-produced MAVAG B.5 'Bulldog' type. This is a 5-ton lorry with a Lang-diesel motor. Negotiations are in progress to get it built to forestry-authority specifications.

2856. Oreshkin, S. I. Tekhnologiya lesozagotovok pri vývozke lesa v khlýstakh. **[The technology of logging operations when timber is extracted in tree-length logs.]** *Lesn. Prom.* 1949 (9), (4–7). 1 ref. [Russ.]

An illustrated account of trials, with chief reference to trials at Balakirev, of the author's scheme of extraction and primary conversion adapted to 'continuous-flow' logging operations with power saws. The essential feature of the scheme is that the timber is extracted and transported as tree-length logs by narrow-gauge forest railway to a central depot, where primary conversion into round timber assortments and fuelwood is fully mechanized. The stands cut were Birch and Aspen (215 cu.m./ha., average diameter 25 cm.), felling being done with TSNIIME K–5 power saws and skidding with either KT–2 tractors or the TL–3 winch. Under the author's system there is no 'forest' log depot: the work of cross-cutting, sorting and stacking is all done at the central depot, so that forest operations were confined to establishing suitable loading points, with TL–1 winches or electric cranes for loading, beside the railway. Notes are included on the rolling stock used, the most favoured type being paired flats with simple modifications (mainly the provision of swivelling bunks with safety release sockets for the retaining stakes). These took loads of 16–24 cu.m. per pair of flats. On arrival at the central depot, unloading was done by two TL–3 winches and lifting tackle. The flats were moved up and away, as required, by a cable from one of the winch drums, thus releasing the engine for its return trip. After cross-cutting by power saw (TSNIIME K–5 or VAKOPP), the timber was taken by chain conveyor to be mechanically stacked, while fuelwood—cut by pendulum saw and split by a mechanical cleaver—passed by another conveyor to separate stacks. A table is given to

show the type and number of machines used, number of workers, output per machine shift and per man-day, and man-days per 1,000 cu.m., for the complete series of operations from felling to loading of converted products on to wide-gauge railways at the central depot. These operations occupied 84 workers in all, with an average output of 1·79 cu.m./man day.

2857. ORLOV, S. F. Perspektivy razvitiya tyagovykh mashin dlya bezrel'sovogo lesotransporta. **[Prospects of development of traction machines for rail-less timber transport.]** *Lesn. Prom.* 1949 (11), (4–6). [Russ.]

A general discussion of the present main needs in the organization and equipment of logging, extraction and primary conversion in Russia. The chief point, in the author's opinion, is to secure maximum concentration of laborious work at central depots for primary conversion, where complete mechanization can be effected. In order to eliminate as much as possible of the 'forest' work, it is desirable that the skidding or hauling machines should be capable of performing all loading and transport functions under heavy forest conditions. The main lines of the whole process should be: (1) Preparation of tree-length logs by power saw supplied from a mobile generating station. (2) Skidding by winch or tractor (the former chiefly in boggy places or in mountainous areas). (3) Loading on to main transport vehicles, to be done by the vehicles themselves, and transport to the central depot. (4) Concentrated mechanized cross-cutting, sorting, loading and unloading at the central depot.

The essential requirement here is the development of transport vehicles for stage (3), to work on rail-less forest roads, i.e. in heavy going, on local fuel, e.g. wood of high moisture content. A table is given of the main characteristics of the types of skidding tractor and timber lorry required, accompanied by notes on various desirable features in such machines.

2858. PARFENOV, G. M. Letni avtomobil'ny polupritsep v usloviyakh zimney raboty. **[Summer lorry semi-trailer adapted for winter use.]** *Lesn. Prom.* 1949 (9), (18–19). [Russ.]

Gives a photograph and a diagram to show how wooden, metal-shod runners may be fitted, after temporary removal of the wheels, to adapt a wheeled semi-trailer to winter use.

2859. KISHINSKI, M. I., and VOL'F, V. I. Pogruzhatel' pritsepa na avtomobil'. **[A device for loading a semi-trailer on to a lorry.]** *Lesn. Prom.* 1949 (16), (16–18). [Russ.]

Details of machinery (MPP–3) fitted to the ZIS–5 lorry for lifting and holding an empty semi-trailer (1–PR–5 or 2–PR–10) to be carried pick-a-back on the lorry in order to reduce wear and tear during empty trips. Diagrams and photographs are included.

2860. KRUEGER, M. **Harvesting the forest crop: log transportation.** *Emp. For. Rev.* 28 (4), 1949 (356–60). 4 refs.

A paper presented at the United Nations Scientific Conference on the Conservation and Utilization of Resources, Lake Success, Aug. 1949. In the U.S.A., and especially on the Pacific Coast, the trend has been away from railways towards the use of lorries for log transport. Important factors in the use of lorries for log transport are:—(1) *Size of load.* Unit costs tend to decrease with increase in the size of load. (2) *Size (diameter) of timber.* With small equipment, unit costs decrease with increase in diameter. The importance of this factor diminishes with the increase in the size of lorries. (3) *Distance of haul.* Unit costs vary in direct ratio to distance. Where a given amount of elevation must be overcome, preliminary data seem to show that gradients up to 5% against the load are more economical than lower gradients with a consequently longer haul. (4) *Efficiency of loading equipment.* The speed needed in loading has favoured the use in the U.S.A. of mobile revolving equipment of the power-shovel type. (5) *Road construction and equipment.* The intensity of the road system increases with increase in density of stand and with decrease in cost of construction. The tendency in the U.S.A. is towards well constructed roads with good surfacing. *From author's summary.*

2861. KULYABIN, G. F. Lesovozny avtomobil' s gazogeneratorom na shvyrke. **[A timber lorry with a gas-generator run on half-metre fuelwood.]** *Lesn. Prom.* 1949 (8), (13). [Russ.]

The generator, designed by the author, runs on billets (Birch and Pine) 0·5 m. long and 60 × 80 mm. in section and is fitted to a ZIS–21 timber lorry. The performance of this experimental lorry has been equal to that of the

ordinary ZIS–21 run on smaller fuel, viz. an average load of 8 cu.m., speed when loaded 15–16 and when empty 19·5–22·5 km./hr. The wood consumption of the generator was lower than that with the usual small fuel, and the large fuel would be far easier and cheaper to prepare.

2862. Orlov, S. F., and Gol'dberg, A. M. Primenenie svezhesrublennoy drevesinȳ v seriynȳkh gazogeneratornȳkh ustanovkakh. **[The use of green wood in mass-produced gas-generator plants.]** *Lesn. Prom.* 1949 (12), (8–10). [Russ.]

Experiments by the Leningrad Academy of Forest Technology showed that the ZIS–21 gas generator can be readily and simply converted by repair-shop technicians to work on green wood fuel. Results of 300-hour trials of two variants differing in constructional details, using wood blocks ($45 \times 35 \times 75$ mm.) of $83 \pm 6\%$ moisture content based on oven-dry weight, are shown in tables and graphs, and the constructional details themselves are illustrated in sectional drawings. A number of vehicles have been successfully converted to operation on green wood fuel. Other types of Russian gas generators can be similarly converted if certain necessary dimensional adjustments are made.

2863. Bobkov, N. P., Mikhaylovski, Yu. V., Rȳzhkov, A. N., and Tsvetkov, B. S. Gazogeneratorȳ TsNIIME na svezhesrublennȳkh drovakh. **[TsNIIME gas generators for green half-metre fuelwood.]** *Lesn. Prom.* 1949 (10), (9–12). [Russ.]

The usual Russian types of gas generator for vehicles have been designed for wood fuel cut small (to *ca.* $50 \times 60 \times 70$ mm.) and with a moisture content not exceeding 22%. To overcome the fuel-preparation problem, the Central Research Institute for Mechanization (TsNIIME) has constructed and tested generators capable of running on billets 500–520 mm. long and up to 90×90 mm. in section (or 90 mm. diameter, if round), with moisture contents up to 100% based on the oven-dry weight of the wood. The present paper describes and illustrates diagrammatically two such types, with test results: (1) the TSNIIME–17 for the KT–12 tractor; and (2) the TSNIIME–18 for the PES–60 mobile power station. Results are reported to be very satisfactory, and a series of such generators is to be manufactured for longer testing under service conditions.

2864. Gazonnaud, P. **Log transportation in tropical forest exploitation.** *Emp. For. Rev.* 28 (4), 1949 (350–5).

A paper presented to the United Nations Scientific Conference on the Conservation and Utilization of Resources at Lake Success, Aug. 1949. The author examines the peculiar problems presented by tropical conditions, and discusses some of the methods tried in French tropical Africa. The following possible improvements are suggested:—(1) *Dense stands on easy ground*: A tractor with large-section tyres, two axles, several speeds, and a trailer equipped with log-loading devices should be capable of performing both primary extraction and transport on the roads, which must be fairly well constructed. (2) *Scattered stands on easy ground.* The solution consists in the use of the G.M.C. lorry with trailer. These are sturdy machines which can carry half the load (7–10 tons) in the lorry itself and have a remarkable grip owing to their 3 axles. They can be used on very rough, low-cost tracks and they facilitate the exploitation of widely scattered forest crops. In favourable circumstances, G.M.C. lorries can even be driven right up to the trees, so that no reloading is necessary. These vehicles, at present petrol-driven, should be equipped with 100-h.p. diesel engines. (3) *Dense stands on difficult ground.* Primary extraction by heavy caterpillar tractors, and road transport on trailers (load 30–40 tons) attached to tractors equipped with tyres. The importance of proper design and construction of roads is stressed. (4) *Scattered stands on difficult ground*; necessitates the use of caterpillar tractors for primary extraction, light lorries for the first network of tracks, and traction engines for the main road.

2865. McColl, B. J. **The Ferguson-Bombardier tractor.** *Woodl. Sect. Index Canad. Pulp Paper Ass.* No. 1061 (*B–8–f*), 1949. pp. 3 + 2 photos.

Description of the conversion of a light farm tractor for sleigh hauling.

2866. Burk, A. H. **Standardization of heavy duty logging sleighs.** *Woodl. Sect. Index Canad. Pulp Paper Ass.* No. 1062 (*B–8–d*), 1949. pp. 8.

Suggested specifications put forward by the Sleigh Committee of the Woodlands Section.

2867. KORUNOV, M. M. Odnopoloznÿe traktornÿe sani. [**Single-runner tractor sledges.**] *Lesn. Prom.* 1949 (11), (6–8). [Russ.]

Reviews the history of the development of single-runner timber sledges, tabulating the chief characteristics of 6 different types—the Vostokostal'lesa 1939, TSNIIME mod. B 1938, GIZ–38 (YaG) 1938, GYaZ 1 and 2 of 1939 and 1940, and TOS–20G of 1946 [cf. *For. Abstr.* 9 (No. 2318)]. Such sledges have the advantages of reduced friction, better manoeuvrability and lower construction costs than ordinary sledges, and have proved their superiority in practice. The importance of proper construction and maintenance of single-rut ice roads for these sledges is emphasized.

2868. COLLIER, R. D. **Some recent developments in snowmobiles for hauling pulpwood.** *Woodl. Res. Index Pulp Pap. Res. Inst. Can.* No. 77 (*B*–8-*e*), 1950. pp. 3 + 2 photos.

Includes description and photographs of the latest model of the Bombardier passenger snowmobile, manufactured by Bombardier Snowmobile Ltd., Valcourt, Quebec.

2869. SHINE, W. **Timber extraction by chute at Glenmalure.** *Irish For.* 6 (1/2), 1949 (22–8).

Describes the construction and operation of a short wooden (dry) chute for extraction of thinnings for roadless areas of the Glenmalure Forest. The chute was built on a slope of 34°, about 300 Larch poles (value £10) were used in its construction, labour costs were £65, and allowing £5 for wire and staples, the total cost was £80. In the first 2 months over £400 worth of material was extracted which would otherwise have been lost.

2870. VORONITSYN, K. I., KRIVONOGOV, N. I., and SHCHELKUNOV, V. V. Legki motovoz dlya perenosnÿkh rel'sovÿkh putey. [**A light [producer-gas-driven] locomotive for portable tramways.**] *Lesn. Prom.* 1949 (10), (6–8). [Russ.]

The ALTI-2 producer-gas-driven locomotive, designed by the Archangel Institute of Forest Technology to replace horse traction on portable tramway lines, is described and figured, and details are given of its behaviour in a 2-months test. Results were entirely satisfactory. The locomotive weighs 4·4 metric tons, has a 30-h.p. engine and a speed of 5·8 km./hr. when pulling its load. It held the rails well, even when the track was in very poor condition.

2871. KOPEIN, V. I. Letnee ispol'zovanie ratsionalizirovannÿkh dorog. [**Summer use of rationalized roads.**] *Lesn. Prom.* 1949 (6), (7). [Russ.]

The success of logging operations under the Vologdabumles 'Trust' in 1948, in spite of extensive constructional and repair works which hampered transport on the narrow-gauge forest railways, is attributed largely to summer extraction, rendered possible by the construction of some 20 km. of Decauville track and 50 km. of rails made from round logs, with portable spur tracks, on which horses were used for traction. This network of tracks was extensive enough for preliminary skidding to be dispensed with, the spur tracks being laid at intervals of 15–25 m. It was found best to use fairly short spurs (up to 150 m. long), since the greater volume of timber extracted on longer ones would have meant disproportionate expenditure on making up a horse path fit to stand the extra wear. In view of the favourable experience of 1948, extensions of such tracks are envisaged for the 1949 season.

32.92-4. Water Transport

See also *For. Abstr.* 11 (No. 2762).

2872. CALLIN, G. Om flottning av björk och asp. [**The floating of Birch and Aspen.**] *Norrlands SkogsvFörb. Tidskr.* 1948 (4), (321–79). 9 refs. [Sw.] (*Medd. SkogsforsknInst., Stockh., Ser. Uppsatser* No. 9.)

Reviews the few previous investigations on the floating of Birch and gives the results of the author's own work [cf. *For. Abstr.* 10 (No. 2096)] on Birch and Aspen, with the following conclusions: (1) *Birch*: The safest way of rendering Birch floatable—and perhaps the only one if the wood is to be long in the water—is 'sour-felling' followed by the application of an impregnant to the log ends, and if possible to large knots, before floating. The preparation used was 75% Birch tar, 20% pitch and 5% tallow, but there is room for further research to find the most effective and cheapest preparation, as also on the entry of water

through knot surfaces and the economics of treating these. Unbarked logs floated best and completely barked logs worst. The period over which completely barked logs were floatable appeared to be the shorter, the lower the density and the moisture content of the wood. (2) *Aspen*: Floats well—best when either barked and dried or 'sour-felled', and worst when left unbarked. There should be no difficulty with this species if the logs are sufficiently dry. If Aspen is winter-felled for floating in the following spring, it should be completely barked: this, however, is troublesome in winter, but very easy in the sapflow period. Spring-felled timber, if open stacked over the summer, can be made floatable by strip-barking. The use of impregnants on log ends of 'sour-felled' Aspen increased its 'floatability', but the difference was not large and it would probably be cheaper to secure the same effect by barking and air drying.

The paper includes data on a number of factors investigated for their possible bearing on 'floatability', e.g. density, moisture content, log length, decay, width of annual rings, position of log in tree, water penetration during floating, course of air drying.

2873. Tuovinen, A. Näkökohtia tukkien autoniputuksesta. [**Bundling [and unloading] of logs on lorries.**] *Metsät. Aikak.* 1949 (2), (295–8). [Fi.e.]

[Cf. *For. Abstr.* 10 (No. 1970)]. By contrast with older methods, the author describes and illustrates experiments carried out in Finland since 1948, with the whole lorry load forming a single bundle. This is dropped, still as a single bundle, directly into the water or on to the ice (according to season) by driving the off-wheels of the lorry and its trailer up ramps, which are differently elevated and designed for each axle. During 1949, *ca.* 100,000 logs were handled in this way, mainly in south-west Finland, and for 1950 the number should be at least doubled; pulpwood of over 2·5 m. is also being handled.

2874. Gastev, B. G. Razgruzka avtomobilya putem naklona. [**Unloading timber lorries by tilting.**] *Lesn. Prom.* 1949 (9), (17). [Russ.]

A method of launching timber extracted by lorry in summer, consists in making a rut for the wheels on the bank side of the lorry. When driven into this rut, the lorry has a side-to-side tilt of 6–8°, allowing most of the logs, on release, to roll of themselves into the river, the rest being easily pushed off.

2875. Prokof'ev, B. M. Skatka lesa v vodu lebedkami i traktorami. [**Rolling logs into the water with winches and tractors.**] *Lesn. Prom.* 1949 (6), (13–15).

Gives an account, with illustrations, of methods of launching stacks or bundles of logs with the aid of winches (models TL–3 or TsL–3, driven from the PES–12 or PES–60 mobile power generators) or tractors (KT–12 or S–80). (1) Three methods using winches, and the appropriate arrangement of the tackle, are described; they differ mainly in the location of the winch—(*a*) on the opposite bank to the timber to be launched, or on floats in the river; (*b*) to the landward of the timber; and (*c*) between the timber stacks and the bank, to one side of the stack being launched. (2) Tractors, when used for logs that have been stacked ready bundled, work in pairs. A pair of tractors, one in each alley between the skidways on which the stacks are laid, pulls each bundle to the brow of the bank; the cables are unfastened, the tractors return for a fresh bundle, and this, when brought up behind, pushes the first bundle into the water, and so on. Where the stacked logs have not already been bundled, it is more efficient to employ the tractors separately over a broader front, each tractor then serving several stacks and giving time for manual bundling to be done between its visits to the same stack.

2876. Kozhanov, D. I. 'Unzhlesovets-3' na splotochnykh reydakh. [**The 'Unzhlesovets-3' at rafting depots.**] *Lesn. Prom.* 1949 (6), (16). [Russ.]

Gives some details of the use of this installation [see *For. Abstr.* 9 (No. 1655)] as reported from observations made by the Volga-Kama branch of the Central Timber-floating Research Institute in 1948. The performance of the installation was satisfactory; in fact, the sorting-works feeding it could not in some instances turn out sufficient material to keep it in continual operation, and it is in this and similar directions that improvements are most needed.

2877. Putkisto, K. Eräs erottelu-niputuslaitoskeksintö. [**A device for sorting and bundling logs.**] *Lyhenn. Trävarutidskr. Finl.* 30 (22), 1948 (409–11). [Fi.] P.R.

Logs and pulpwood are guided to the floating installation by means of deep booms, and a revolving mat lifts them out of the water. Long logs pass over a set of rollers and drop into the water again; short logs drop through an opening between the mat and the first roller. Three or 4 men are needed to guide the logs lengthwise. The installation is estimated to deal with 22,000 logs and 286,000 cordwood billets in 24 hours (continuous shifts). It costs about 500,000 mk. After this rough sorting, the logs and small wood are carried by the current to a finer sorting installation, placed roughly at right angles to the other, on a fixed or floating raft. The logs pass up the hooks of a hoist to the hooks of a horizontal conveyor which carries them to the compartments indicated by their (ownership) brands. Two compartments are provided for each brand. The actual sorting is done by a single man, who adjusts a plate on the bar carrying each pair of hooks so that it trips on an upright at the selected compartment, dropping the log into the latter. There the logs pile up on chain slings, in which they are bundled, lowered into the water and floated away.

The hoist and horizontal conveyor each require a 15-h.p. motor. The rate of sorting should be 20–30 logs/min. or, working 3 shifts, 28,000–43,000 logs in 24 hours. A total of 25 men is required per shift.

2878. Kuznetsov, D. V., and Labutin, N. A. Opyt vnedreniya uskoriteley na Obvinskom reyde. [**An experiment on the introduction of a booster at the Obvinsk floating-and-rafting depot.**] *Lesn. Prom.* 1949 (11), (18–19). [Russ.]

In sorting-and-bundling works in water with scarcely any current, it is difficult by purely manual methods to keep the logs moving, with their longitudinal axes at right angles to the corridor booming, along their appropriate channels. One of the authors (Labutin) has therefore devised a booster system which has been tested and proved successful by the Volga-Kama branch of the Central Timber-Floating Research Institute at the Obvinsk floating depot, where in the last floating season it is reported to have saved 3468 man-days. The essentials of the system are as follows:—At intervals along a given corridor, preferably 25 m. apart (but actually 30–35 m. in the trials), are built booster sections consisting of a supporting frame carrying two iron rails 1·75 m. apart, in the middle of and parallel to the sides of the corridor. Along each rail travels a carriage on 4 rollers gripping the rail above and below, and on its under side each carriage is furnished with a hook hinged so that it catches the logs when the carriage moves in one direction and is automatically disengaged in the other. The booster sections are 5 m. long, but the carriages travel only 4 m. back and forth along the rails. Two cables pass along the successive booster sections and are fixed to the tops of the carriages in true alignment, so that each pair of carriages moves back and forth together. At both ends of the booster system the cables are united into one cable, and each end is led to a drum of the TsL–2 winch. By operating first one and then the other winch drum alternately, the whole cable system is given a reciprocating motion, one 4-m. stroke engaging all the carriage hooks along the line with any logs in their sections (which are thus propelled in the desired direction), whereas on the next, idling, stroke all the hooks hinge out of action and sweep back 4 m. to their initial position. In between the booster sections, manual workers keep the logs straight with pike poles. Some improvements are being worked out, the chief of which is a winch with an automatic reversing action.

2879. **Technical knowledge reduces costs [: a method of loading floating logs.]** *Paper Tr. J.* 130 (3), 1950 (12). P.R.

By using Wellman type 'T' log grabs on Lorain 820 cranes, the Bowaters Newfoundland Pulp and Paper Mills have been able to reduce the number of men needed for loading from 80 to 20 and have extended the loading season by more than a month by eliminating the manhandling of logs in cold water. A barge is towed to the pick-up point, and the grabs fitted to the cranes lift the loads out of the water, and dump them into the barge.

2880. Shibalov, V. I. Opyt mekhanizatsii vygruzki lesa bol'shegruznymi puchkami. [**An experiment in the mechanization of the moving of timber in large bundles.**] *Lesn. Prom.* 1949 (8), (15–16). [Russ.]

A report, with diagrams and photographs, on the experimental use of a single-drum winch, with a tractive power of 5 metric tons, to haul bundles of logs containing 10–12 cu.m. out of water and into stacks on the bank. A 1-ton winch, mounted on a pontoon, was used

to haul back the cable. The log bundles were hauled up log ramps to the stacks by the main winch, situated behind the stacks. It was found best, as regards efficient utilization of the winch and the rational organization of the work, to build the stacks of bundles in single layers at a time, starting at the front (bank-side) end The team used comprised a winch operator, two stackers and two men on the pontoon to hitch up the tackle on the bundles. With this set-up, the performance per shift was 530 cu.m. The method could be adapted to larger bundles (20–30 cu.m.) but this would require a winch with a tractive power of 15 tons. Suitable winches are being designed.

2881. CHEBOMAREV, I. K. Kerchevski reyd v navigatsiyu 1949g. **[The Kerchev timber-floating-and-rafting depot in the 1949 season.]** *Lesn. Prom.* 1949 (12), (18–20). [Russ.]

A general review, mentioning *inter alia* a method devised by V. A. Kuznetsov for breaking up spiral movements in fast river currents and reducing their speed. This consists in the construction of underwater baffles made of branchy portions of trees held top downwards in floats to form lines parallel to the bank and in the path of the turbulent current. The effect is to increase the rate of flow of the deep water in mid-river and reduce it, e.g. from 1·62 to 0·39 m./sec., near the banks. A diagram is given in illustration. These cheaply constructed devices were used in connexion with spring rafting.

2882. KORMILITSYN, M. A. Splav lesa v morskikh plotakh-sigarakh po Chernomu moryu. **[Rafting of timber in sea-going 'cigar' rafts on the Black Sea.]** *Lesn. Prom.* 1949 (7), (11–13).

Describes the construction of such rafts containing 1,800–2,000 and 2,800–3,000 cu.m. of timber, as tried with success since 1945 on the Black Sea, and suggests that this practice might well be extended to the Caspian and White Seas and to timber transport in the Soviet Far East.

2883. LEFÉBURE, J. **Étude sur le transport des bois de la côte occidentale d'Afrique. [The transport of timber from the West Coast of Africa.]** *Bois For. Trop.* No. 11, 1949 (315–25). [F.]

A study of the methods employed, in French and English colonies, for loading logs on board ship, including the breaking up and sorting of rafts.

32.95. Transport by Air. Ropeways. Cableways

2884. WERQUIN, J. Où en est la question de l'hélicoptère-grue? **[What progress has been made with the helicopter-crane?]** *Bois For. Trop.* No. 11, 1949 (288–94). [F.]

The author discusses the various uses of the helicopter in forestry and particularly its possible use for extraction of timber from tropical forests, and the mechanical and economic factors to be taken into account in designing a machine for such a purpose. The Société Nationale de Constructions Aéronautiques is engaged in designing a machine (the NC 2.420). This is gas-jet-propelled with a two-blade rotor, the generator being situated in the fuselage behind the seats of pilot and passenger. The three-wheeled undercarriage minimizes the risk of capsizing. It would be possible to install a winch capable of lifting a normal load of 2·5 metric tons, and 5 metric tons when supercharged. Speed varies from 0 to 130 km./hr.; it can transport a load of 2·5 metric tons for 200 km., or fly for 10 hr. without a load. With the existing motor-compressor it consumes 350 kg. petrol per hour in the most onerous conditions (i.e. loaded and hovering) and transports its load at 130 km./hr. at a rate of 0·7 kg. of fuel per km.-ton. These figures will be reduced by about $\frac{2}{5}$ with the new generator which is planned.

2885. LLOYD, A. H. **A new method of timber extraction by cable.** *Emp. For. Rev.* 25 (4), 1949 (337–9 + 4 photos).

A description of the Wyssen cable system. [Cf. *For. Abstr.* 10 (No. 1970).]

2886. MCCOLL, B. J. **Cable yarding.** *Pulp Paper Mag. Can.* 50 (13), 1949 (118–20, 122, 124, 126, 128, 130). [Woodlands Section, C.P.P.A.]

A short account of various methods, with a summary of the results of experience in the use of these methods by various Canadian companies. A vocabulary of terms used in these operations is appended.

2887. Teterin, B. A. Trelevka lesomaterialov 'gibkoy vetv'yu'. [**The 'flexible-branch' method of timber extraction by cable.**] *Lesn. Prom.* 1949 (12), (15–16). [Russ.]

This new system, devised by B. A. Raski, is based on the principle that if a slack line is fixed at different heights at its two ends, a block on it will travel some distance towards the lower end, and if the line is simultaneously tautened, the block will approach the lower end at a high speed.

The application is as follows:—Two spar trees are selected, 120–140 m. apart on the midline of a felling area *ca.* 50 m. wide. To the far tree is fixed one end of the working cable (15·5 mm. in diameter) at a height of 15 m., and the tree is guyed at this point. The other end of the cable is passed through a block, suspended on the near tree at a height of 4 m., and is attached to the hook of a pulley block. Through the latter passes a cable 9·2 mm. in diameter which is secured at one end to the winch frame, while the other end is wound on to the winch drum. A single-drum TL–1 winch is used, driven by a 4·5-kw motor fed from the same mobile generating plant that supplies the power to saws. Motor and winch together weigh only 200 kg. The working cable carries a travelling carriage having 2 large rollers above and 2 small rollers beneath the cable, and from which a load of logs is suspended in chokers or tongs. On the farther side of this carriage the working cable carries a single-roller block from which are suspended one or two logs lying on the ground and serving as anchors.

In operation: (1) two workers on the felling area hook up a log or bundle of logs to the travelling carriage and signal to the winch operator. (2) The latter starts the winch and the load is lifted and carried towards the near tree at *ca.* 8 m./sec. (3) A worker at the near tree judges when to signal for the winch to stop and let down the cable so that he can unhook the load. (4) While the load is being unhooked, the cable is lowered so that it can be pulled down by the two hookers-up by means of the lines from the single-roller block, and kept down by a hook fastened to a stump. (5) The lowest point of the working cable is now again near the far end of the area, and when, on a signal, the winch man tautens the cable, the travelling carriage returns to this point and the process can be repeated.

The apparatus is simple, and can be erected in 2–3 hours, is portable by a single horse or for short distances by the team of men, and consumes little power. Only 4 workers, including the winch men, are necessary.

In performance tests the output was 4–9 cu.m./hr. or 35–55 cu.m./shift. It is suggested that where necessary the range of operation could be extended by a relay of such tackle, in which case only one hooker-up should be necessary at the relaying point and one winch could serve two sections.

2888. Perfilov, M. A. Bȳstro osvoit' trelevochnȳe lebedki—delo chesti lesozagotoviteley. [**Rapid 'assimilation' of skidding winches—a point of honour for loggers.**] *Lesn. Prom.* 1949 (8), (5–7). [Russ.]

Describes, with diagrams, the use of the TL–3 winch, with a mast or spar 14–16 m. high, for semi-aerial skidding to a narrow-gauge horse tramway. The timber was extracted in tree lengths, and cross-cut and sorted on platforms on either side of the mast. The felling area was limited by a circle of radius 250 m. (from the mast), worked in successive sectors. For hanging the pulley blocks on trees at the circumference of the circle, special hooks, which are illustrated, were used. The long shanks of these hooks pass through holes bored in the marginal trees used and are secured by nuts on the far side. The hooks may be put up in advance. The winch team consisted of the winch operator and 4 men. The cross-cutting, sorting and loading, were done by a power-sawyer and his mate plus 4 men. Output averaged 42·9 cu.m./[8-hr.?] shift. Some other examples of the use of this type of winch are briefly mentioned and it is concluded that on areas with a stocking of 100–150 cu.m./ha., winch output should average 35–40 cu.m./shift, and on those with a higher stocking it should average 40–50 cu.m.

2889. Zav'yalov, M. Ya. Trelevka lebedkami v Rovdinskom lespromkhoze. [**Skidding with winches in the Rovdinsk Lespromkhoz.**] *Lesn. Prom.* 1949 (8), (7–8). [Russ.]

Reports briefly on the use of the TL–3 winch [cf. preceding abstract] for skidding timber felled by power saw, using a team of 5 loggers, 3 skidders and 8 cross-cutters, sorters and loaders. The performance was 48–50 cu.m./winch-shift. The organization of the work is

outlined. Loading was done direct to narrow-gauge railway wagons, using Zav'yalov's gantry crane. [See *For. Abstr.* 11 (No. 1181).]

2890. Udalov, V. A. Povȳsit' proizvoditel'nost' lebedok na trelevke. **[Increase the productivity of winches in skidding.]** *Lesn. Prom.* 1949 (9), (17–18). [Russ.]

The TL–3 winch skids timber in from a radius of 250 m. This range was successfully extended to 400 m. by using a supplementary TL–1 (single-drum) winch for skidding timber on the extra 150 m. to points where it could be reached by the TL–3. The TL–1 was shifted about, as required, on a sledge. Both winches were supplied with power from a PES–60 generator.

2891. Oguy, M. S. Rabota trelevochnȳkh lebedok TL–3 v gornȳkh usloviyakh Karpat. **[The work of TL–3 skidding winches in the mountain conditions of the Carpathians.]** *Lesn. Prom.* 1949 (11), (10–12). [Russ.]

From a felling area at a mountain top 1,200 m. above the river Bȳstritsa, timber was brought down by wooden or earth slides to the right bank and transported by overhead cable, powered by the TL–3 three-drum winch, across the steep-banked river for a distance of 200 m. to a railside depot. The article describes with diagrams and photographs, the lay-out, construction and operation of the cableway, and of the organization of the work.

2892. Zhilonov, G. Vozdushnaya trelevka na zimney splotke drevesinȳ. **['Aerial skidding' in the winter rafting of wood.]** *Lesn. Prom.* 1949 (10), (15–16). [Russ.]

A note on the use of Lisichkin's method of cable extraction and loading [cf. *For. Abstr.* 10 (No. 2678)] at the Voznesensk station in Gor'ki Province, where with 10 sets of tackle 15,000 cu.m. were handled in the winter 1948–49. 'Continuous-flow' methods were applied to the process of power-saw logging and extraction by Lisichkin's method in Feb.–March 1949. The same cable method was employed for short-distance log transport at a floating depot in the Voznesensk area, using masts instead of trees for suspending the tackle. The chief weakness of the method is the slowness of the hand lifting tackle used, and it is considered that this part of the work should be mechanized, preferably by some light electrical device.

2893. Kishchenko, T. I. Potochnȳ metod trelevki i pogruzki lesa lebedkoy. **[A 'continuous-flow' method of skidding and loading timber by [the TL-3] winch.]** *Lesn. Prom.* 1949 (12), (13–15). [Russ.]

2894. Weatherby, H. **Southern U.S. version of 'peanut picker' seen on coast.** *B.C. Lumberm.* 33 (9), 1949 (74, 78).

The 'Loggers' Dream', manufactured by Taylor Machine Works, Mississippi, is a mobile combined yarder and loader and consists, in its simplest form, of a steel yarding tower mounted on a truck body, the tower being used in the same manner as a small spar tree. Power from the winches comes from a Ford industrial motor. It is claimed that logs 4 ft. in diameter and 40 ft. long, lying as much as 900 ft. from the machine, can be brought in. The 'Loggers' Dream' can be mounted on almost any type of conveyance. [Cf. *For Abstr.* 10 (No. 2648).]

32.96. Loading and Unloading

See also *For. Abstr.* 11 (Nos. 2762, 2873–5, 2879, 2892–4).

2895. **Fast mobile loader changes character of Oregon logging operation.** *Lumberm.* 76 (10), 1949 (86–7).

A Thew Lorain, rubber-tyred Motor Crane loader [cf. *For. Abstr.* 8 (No. 1877)] is used by the Brightwood Logging Co. in the Mt. Hood national forest for picking up logs skidded to the logging road by tractor. This system increases the number of loading points along the road and reduces skidding distances and damage to the ground surface.

2896. Murzinkin, I. I., and Smirnov, A. V. S-emnaya pogruzochnaya strela na traktore KT–12. **[A loading derrick arm for the KT–12 tractor.]** *Lesn. Prom.* 1949 (9), (15–16). [Russ.]

Gives a description and diagram of a (round-) timber derrick arm devised and tested by the authors for enabling this tractor to load timber on to railway wagons. The mounting takes 10 minutes, using 3 men. Loads of 1–1·5 metric tons can be dealt with.

2897. Khovanski, T. V., and Zhegalin, I. I. Uzkokoleynȳ parovoy kran na pogruzke

lesa. [**A narrow-gauge steam crane for loading timber.**] *Lesn. Prom.* 1949 (11), (14–16). [Russ.]

Gives details of the crane, and test results which showed some constructional defects that will have to be correctcd.

2898. KUZNETSOV, Z. I. Odnobarabannÿe lebedki na pogruzke lesa. [**Single-drum winches for loading timber.**] *Lesn. Prom.* 1949 (8), (9–10). [Russ.]

A simple method of using the TL–1 winch (1 metric ton traction power), driven by a P–42–4 (5·8 kw) motor, for loading logs on to railway wagons. With a team of 1 winch operator and 3 men, the average performance was 18·8 cu.m./man-day.

2899. MUZYUKIN, V. S., and VASIL'EV, G. M. Pogruzka drevesinÿ lebedkami TL–3 v vagonÿ shirokoy kolei. [**Loading of wood by TL–3 winches into broad-gauge railway wagons.**] *Lesn. Prom.* 1949 (11), (13–14). [Russ.]

Describes, and illustrates with a diagram and photographs, the operation of this winch with a rough timber derrick for loading bundles of logs from railside stacks into wagons. Performances for the months of April–July, 1949, are tabulated, showing a peak (the July average) output of 113 cu.m./machine shift or 28·5 cu.m./man day.

2900. GNEDENKOV, A. I. Elevator DSP–2 dlya pogruzki kruglogo lesa. [**The DSP–2 log hoist for loading round timber.**] *Lesn. Prom.* 1949 (9), (16–17). [Russ.]

A brief description, with a photograph, of the DSP–2 timber-framed hoist for loading logs on to wide-gauge railway wagons.

It is driven by a 12-h.p. internal-combustion engine and has two pairs of chains with hooks, one pair (3·4 m. apart) for hoisting the logs to the top, and another (3·1 m. apart) for controlling them as they slide down an incline which overhangs the wagon being loaded. This incline can be lowered out of the way by hand windlass when the load on the railway wagon has risen sufficiently high. The chain speed is 0·4–0·5 m./sec.

The elevator's load capacity is 1 metric ton. It is mounted on a low railway trolley but is not self-propelled.

2901. FOBES, E. W. **Improved harvesting methods. Equipment survey notes. Improved log loading tongs.** *Rep. U.S. For Prod. Lab., Madison* No. R1637–33, 1949. pp. 1. P.R.

The tongs can be unhooked from the log either by the operator of the loader or by a man on the ground, thus eliminating a top loader. An arm with an eye is welded to the upper end of one arm of the tongs and a pulley is attached to the eye. Another eye is welded to the lower end of the other arm of the tongs and a rope attached to this eye passes through the pulley. A pull on the rope releases the tongs.

33. CONVERSION AND PRESERVATION OF WOOD

2902. STAMM, A. J. **Wood [: a review of recent American literature on preservative treatment, fire-retardant treatment, chemical resistance, plywood and laminated wood, wood structures, and modified wood.]** *Industr. Engng. Chem.* 41 (10), 1949 (2149–52). 60 refs. P.R.

2903. JALAVA, M. Koivun ja koivuteollisuuden merkitys Suomessa. [**Significance of Birch and the Birch industry in Finland.**] *Metsät. Aikak.* 1949 (1), (3–6). [Fi.]

A short historical review, covering the main aspects of Birch utilization. Supplies have diminished in the last two decades. Present growing stock is estimated at *ca.* 257 million cu.m. (with bark) or 18·8% of the country's total growing stock, and annual increment 8·4 million cu.m. or 20·5% of the total.

33.1. *Mechanical Conversion excluding the Manufacture of Mechanical Pulp*

See also *For. Abstr.* 11 (Nos. 2817–8).

2904. PANSHIN, A. J. **Dimension stock and other uses of Aspen [*Populus tremuloides*].** *Lake St. Aspen Rep.* No. 12, 1950. pp. 18. 13 refs.

Use of Wastes

See also *For. Abstr.* 11 (Nos. 2968–9, 3000–1, 3016, 3040–2, 3049).

2905. **Wood waste utilization: report of field survey of manufacturing waste in New England, sponsored by Federal Reserve Bank of Boston [: with an account of**

actual and potential uses of waste]. *Bull. Ntheast. Wood Utiliz. Coun.* No. 30, 1949. pp. 27. P.R.

2906. ARIES, R. S. **The utilization of wood waste.** *Wood-Worker, Indianap.* 68 (9; 10), 1949 (36, 38; 34, 36–7). P.R.

Figures for sawmill waste in New England are given, and the cost of, and demand for waste as fuel, litter, sawdust and shavings, and wood flour, are discussed. The main actual and potential uses are for fuel, litter (after shredding), and pulpwood, and as raw materials for the manufacture of producer gas, small turned goods (spools and bobbins), charcoal, activated carbon, wood molasses, roofing and insulating material, fibreboard and hardboard.

2907. ELMENDORF, A. **Wood fibres from veneer waste.** *Paper Tr. J.* 130 (6), 1950 (29–31). P.R.

A machine for producing strand-like fibres out of veneer waste is described. The fibres are cut at the rate of *ca.* 1 ton per hour. They can be felted by mechanical means and lend themselves to the manufacture of highly fire-resistant wallboards whose manufacturing cost will be far below that of plywood. Such boards in the $\frac{1}{2}$-inch thickness are much stronger and stiffer than insulation boards of the same thickness. *From author's summary.*

33.12. Joinery, Turnery, Furniture and Cabinet-making, Wood Bending

See also *For. Abstr.* 11 (No. 2945).

2908. HAYCOCK, A. H. **Principles of machine woodworking: tenoning, mortising and boring.** Technical Press Ltd., Gloucester Rd., Kingston Hill, Surrey. 1949. pp. 135 + 22 photos. P.R.

Describes practical methods of setting up and operating the machines and the technique of preparing and maintaining the cutting equipment.

2909. HAYCOCK, A. H. **Principles of machine woodworking. Four-cutter design (2–4).** *Wood* 14 (12), 1949 (388–91); 15 (1–2), 1950 (30–3; 66–9).

2910. **Special aids for woodworking machines.** *Woodwkg. Ind.* 6 (12), 1949 (742–4). P.R.

Describes an automatic feed attachment, profile cutters of special alloy steel for ordinary softwoods and hardwoods and with tungsten carbide tips for plywood, improved woods, and difficult hardwoods such as Teak and Okoumé, and a small grinder for sharpening profile cutters.

2911. SHAW, J. **Prevention of surface marring.** *Wood-Worker, Indianap.* 68 (9), 1949 (60). P.R.

Discusses causes, prevention and cure of damage to surfaces by staining and scarring during manufacture and finishing.

2912. DOUGLAS, W. **Considerations in sanding.** *Woodwkg. Ind.* 6 (10; 11; 12), 1949 (595–8; 661–4; 733–6). P.R.

Discusses machinery and methods.

2913. **Tumbled wood finishes.** *Wood-Worker, Indianap.* 68 (1), 1949 (60, 62). P.R.

Describes tumbling methods and drums used for finishing in the U.S.A.

2914. **The steam bending properties of various timbers—Part I.** *Leafl. For. Prod. Res., Lond.* No. 45, 1949. pp. 7.

Discusses the bending properties of tropical hardwoods, a few home-grown hardwoods, and some softwoods, giving tables showing the approximate radius of curvature in inches, with and without supporting straps, at which breakages during bending should not exceed 5%; also a classification of the timbers by bending properties.

33.13. Cooperage. Shingles

2915. GEE, J. **Taking care of barrels [: recommendations for storing and handling].** *Manufacturing Chemist, London* 19 (9), 1949 (415–6). D.S.I.R.

2916. **Pipes of wood.** *Wood-Worker, Indianap.* 68 (11), 1950 (26). P.R.

Wood pipe for handling acids is generally produced from solid stock, rounded inside and squared outside. Water and steam-line pipes for use underground are also made from solid stock and are round inside and out. Cores, bored with a hollow-boring worm cutter, may be used as rollers for textiles, or the larger ones may be sawn into staves for built-up pipes. The largest sizes of wood pipes are built up from tongued-and-grooved staves which are

assembled, wound with heavy wire or band iron, coated with a waterproof preservative (creosote, tar or asphalt), and, while the surface is still tacky, rolled in sawdust until enough such wood particles adhere to the surface to form protective coating.

33.15. Manufacture and Use of Veneers and Laminated Wood. Improved Woods. Laminated Materials other than Wood. Glues and Gluing

2917. **Nineteenth annual plywood review.** *Timberman* 51 (3), 1950. pp. 194.

A special number dealing with the manufacture of plywood and containing numerous articles on equipment and methods.

33.15.1. *Manufacture of Veneers and Laminated Wood*

See also *For. Abstr.* 11 (Nos. 2845, 2907, 2926, 2935 et seq., 3103).

2918. KNAUSS, A. C. **Research by United States Forest Service on Douglas Fir plywood.** *Timberman* 51 (3), 1950 (106, 109–10, 112, 114).

Summarizes studies in the use of second-growth Douglas Fir for veneer, made at Madison. [Cf. *For. Abstr.* 11 (Nos. 333, 1203).]

2919. **Oregon laboratory investigating compression effects.** *Timberman* 51 (3), 1950 (138).

A study of the effects of compression on Douglas Fir veneer is being carried out at the Oregon Forest Products Laboratory, Corvallis, in co-operation with two commercial firms. The experiments will have two main objects:—(1) to provide data on the best thickness of veneer for any desired thickness of panel, and (2) to investigate the possibility of pressing plywood to predetermined thicknesses.

2920. **Handling of veneer logs on arrival.** *Veneers & Plyw.* 43 (10), 1949 (14). P.R.

The use of a bulldozer mounted on a track-type tractor is suggested for rolling logs at the mill from the bank into the log pond, in a dry storage yard or even in shallow water. The log can be rolled along quickly by placing the bulldozer blade against its near side and moving the tractor forward.

2921. **Automatic panel stackers.** *Timberman* 51 (3), 1950 (140, 142, 152).

Describes some different types of stacker in use by various firms.

2922. **Estimating veneer content of lathe bolts.** *Veneers & Plyw.* 43 (11), 1949 (26–7). P.R.

A reasonably accurate estimate of the surface of veneer from a given bolt can be obtained by: (1) subtracting the square of the core diameter from the square of the bolt diameter (both in inches). This gives the length of veneer ribbon in linear feet; and (2) multiplying this figure by the length of the bolt in feet. This gives the surface of green $\frac{1}{16}$-in. veneer in sq. ft. For the surface of dry $\frac{1}{16}$-in. veneer 10% is subtracted from, and for dry $\frac{1}{20}$-in. veneer 10% is added to, the green surface figure. The yield of other common thicknesses of veneer ($\frac{1}{32}$-, $\frac{1}{40}$-, $\frac{1}{8}$-, $\frac{1}{10}$-, $\frac{1}{4}$-, $\frac{1}{8}$-in.) is obtained by simple multiplication or division. Specimen calculations are given.

2923. MÖRATH, E. Das Dämpfen und Kochung in der Furnier- und Sperrholzindustrie. **[Steaming and boiling in the veneer and plywood industry.]** *Holztechnik* 29 (7), 1949 (129–34). [G.g.] P.R.

The literature and original experiments on steaming and hot-water treatment are discussed. The optimum temperature is shown to be a function of the specific gravity, the relationship being given in graphs. The time needed to reach the optimum temperature throughout the wood is shown in relation to the thickness of the wood for steam and hot-water treatments. The effect of the treatment on the wood's elasticity, chemical constitution, swelling properties, and tendency to split, is discussed.

2924. MANGIN, M. Applications nouvelles de la variation de vitesse aux dérouleuses à bois. **[New methods of controlling speed of veneer-peeling machines.]** *Rev. Bois Appl.* 5 (3), 1950 (24–6). [F.]

2925. LEINO, E. M. **Apparatus for plugging sheet material and more especially veneers with scarfed plugs.** *Brit. Pat.* No. 631,142, Oct. 27, 1949. pp. 2 + 2 dgms. Price 2*s.* P.R.

33.15.2. *Use and Properties of Plywood and other Laminated Wood*

See also *For. Abstr.* 11 (Nos. 2949–50, 3093, 3129–30, 3135, 3138, 3209–16).

2926. MAKU, T., and MATSUURA, T. **On the tensile strength and elastic modulus of veneer.** *Wood Res., Kyoto* No. 2, 1949 (41–6). [Jap.e.] P.R.

Tests were made on veneers of Japanese Cypress [*Chamaecyparis obtusa*], Birch and Beech [*Fagus sieboldii*] to determine the effect of grain direction on tensile strength, and of pressure on tensile strength, elastic modulus, and specific gravity, using hot- or cold-pressing methods.

2927. RINGELSTETTER, L. A. **Supplement to buckling of flat plywood plates in compression, shear or combined compression and shear. Buckling tests of flat plywood plates in compression with face grain 45° to load—loaded edges clamped, others simply supported.** *Rep. U.S. For. Prod. Lab., Madison* No. 1316–J, 1949. pp. 7 + 2 photos, 3 gphs., 2 tbls. P.R.

[Cf. *For. Abstr.* 9 (No. 1682); 11 (No. 1984).]

2928. WILSON, W. E., and OLSON, L. G. **Deflection of plywood beams due to moisture content change.** *Proceedings, American Society of Civil Engineers, Lancaster, Pa.* 75 (4), 1949 (429–40). D.S.I.R.

Experimental and analytical work shows that: (1) although plywood in general shows dimensional stability, the elongation and shrinkage which accompany change of moisture content are sufficiently large to cause deflections in both I- and T-beams; (2) the effect of change in moisture content can be reduced by designing short deep beams rather than long shallow ones; (3) control to prevent changes in the moisture content of the flanges of a beam does not appear to be feasible; and (4) designs must take into account the maximum probable change in moisture content of the plywood and the permissible deflection of the beams.

2929. [KNIGHT, R. A. G.] **Exterior plywood.** *Timb. & Plyw.* 98 (2534), 1950 (176, 180, 184, 186). [Forest Products Research Laboratory, Princes Risborough.] P.R.

Discusses tests of the weathering properties of plywood.

2930. ARMBRUSTER, E. Beeinflussung der Feuchtigkeitsaufnahme und der Festigkeit von Holz durch Imprägnierung. **[The effect of impregnation on the moisture absorption and strength of wood.]** *Mitt. öst. Ges. Holzforsch.* 1 (2), 1949 (16–20). 1 ref. [G.g.] P.R.

Samples of Beech were impregnated with paraffin or bitumen and compared with untreated specimens. Results are given in graphs and tables. The impregnated specimens showed a decrease in water absorption and in shrinkage and swelling, and an increase in all strength properties over the untreated controls.

33.15.3. *Improved Woods*

2931. KENAGA, D. L., SPROULL, R. C., and ESSLINGER, J. **Preliminary experiments on dimensional stabilization of wood by allylation.** *Sth. Lumberm.* 180 (2252), 1950 (45, 48). 9 refs.

The allylation treatment consisted in soaking wood blocks for 1 hr. in pyridine, and then subjecting them to the vapours of allyl chloride for 24 hours. Although only preliminary, the investigations indicated that a higher degree of stability is obtained than with acetylation. The stabilization is probably caused by a bulking effect due to the formation of an allyl pyridium chloride polymer within the wood cells. There is evidence, however, that the hygroscopicity of the allylated material is increased, and that boiling water leaches and probably breaks down the polymer, the resulting acid hydrolysing the wood.

2932. SPILLER, D. **Effect of heat treatment on equilibrium moisture content of three New Zealand grown woods.** *N.Z. J. Sci. Technol.* 30B (1), 1948 (24–6). 2 refs.

Samples of Rimu (*Dacrydium cupressinum*), Kahikatea (*Podocarpus dacrydioides*) and Pine (*Pinus radiata*) were heated at 86°, 105°, 115°, 130° and 150° C. for 24 hr. Reduction in hygroscopicity was measured by comparing the equilibrium moisture content with that of unheated blocks. With each species, there was a reduction of 1·8–3·1% in the equilibrium moisture at the 4 lower temperatures, and a further reduction of 1·1–1·4% at 150° C. There are significant differences between the species but these have no practical importance. *From author's summary.*

2933. Dosoudil, A. Dauerfestigkeit der verdichteten Hölzer. **[Resistance to fatigue of improved woods.]** *Repr.* from *VDI-Zeitschrift* 91 (4), 1949 (85–8). 6 refs. [G.g.e.] P.R.

Tests to determine tensile/compressive strength under a pulsating load were carried out on compressed solid and compressed laminated wood. The compressed solid wood and laminated wood with parallel veneers both showed good tensile/compressive strength compared with their static tensile strength.

33.15.4. *Laminated Materials other than Wood*

2934. Heebink, B. G., Kommers, W. J., and Mohaupt, A. A. **Durability of low-density core materials and sandwich panels of the aircraft type as determined by laboratory tests and exposure to the weather. Part II.** *Rep. U.S. For. Prod. Lab., Madison* No. 1573–*A*, 1949. pp. 16 + 5 photos, 2 dgms, 6 tbls. P.R.

[Cf. *For. Abstr.* 9 (No. 1673).] Nine sandwich constructions (made with aluminium, glass cloth, and plywood facings on end-grain Balsa, cellular cellulose acetate, and cellular hard rubber cores) were submitted to the following exposures: water immersion, high humidity, high temperature, alternate high and low temperature and humidity, and weathering. The relative durability of each construction was determined by tension and edge-compression tests, weight and dimensional measurements, observation and measurement of warping. Results are tabulated.

33.15.5. *Glues and Gluing*

See also *For. Abstr.* 11 (No. 2926).

2935. Narayanamurti, D., and Dagg, G. D. **A preliminary test on the suitability of Indian timbers for lap joint tests.** *Indian For. Leafl.* No. 107, 1948. pp. 3 + 16 gphs.

Preliminary experiments indicate that Hollock (*Terminalia myriocarpa*), Padri wood (*Stereospermum chelonoides*) and *Canarium* spp., can be used as substitutes for Beech (specified in British standards) for glue-adhesion tests. Mango (*Mangifera indica*), Laurel (*Terminalia tomentosa*), Haldu (*Adina cordifolia*) and White Cedar (*Dysoxylum malabaricum*), are other possibilities. Further tests will be made.

2936. Brandts, T. G., and Griffioen, K. Kort overzicht van de houtlijmsoorten. **[A short survey of kinds of wood glues.]** *Vlugschr. Bosbouwproefsta. Buitenzorg* No. 4, 1949. pp. 9. [Du.] (*Serie Houtlijming* No. 2.)

2937. Iachan, A. Colas para madeira. **[Glues for wood.]** *Revista de Química Industrial, Rio de Janeiro* 18 (201), 1949 (16–9). [Port.] L.B.A.

A theoretical study of the physical and chemical factors involved in the formation of a glue line.

2938. **Synthetic resin adhesives for the woodworking industries: a glossary of terms.** *Bull. Aero Res., Duxford* No. 84, 1949. pp. 11. 11 refs. P.R.

2939. Collinson, H. A. **Resorcinol-formaldehyde resin glues.** *Timb. & Plyw.* 97 (2510), 1949 (579–80, 584). P.R.

Discusses properties and uses in boat-building, as a metal-to-wood bond, and for laminating thick constructions.

2940. Dimond, L. E. **Glues for use with high-frequency heating.** *Repr.* from *Proc. U.S. For. Prod. Res. Soc., 1948* 2, [1949] (226–34). P.R.

Discusses the selection of glues for the 3 principal methods (perpendicular, parallel and stray-field heating) of radio-frequency gluing.

2941. Kadita, S., Kato, N., and Maku, T. **On the strength of joint of radio-heated plywood.** *Wood Res., Kyoto* No. 2, 1949 (1–8). [Jap.e.] P.R.

Experiments were made on the high-frequency manufacture of plywoods made from Buna (Beech), Shina (Lime) and Kaba (Birch) veneers, using different glues. The following results were obtained: (1) the effect of length of heating on joint strength is negligible, but over-rapid heating is undesirable; (2) for Buna plywood bonded with urea resin, and Shina with bean glue, at temperatures of over 80° C., joint strength is 1·3–1·9 times that of cold-pressed plywood; for Buna and Shina bonded with other glues, and for Kaba plywood, joint strength is the same as for cold-pressed plywood; (3) plywood glued by high-frequency has

good water resistance; (4) the quantity of urea-resin glue needed for a strong joint is 30–35 g./cu. ft., and of bean glue 50 g./cu. ft.; there is a slight saving in bean glue used as against the cold-press method; (5) pressure requirements are the same as for cold-pressed plywood; and (6) the length of pressing has no appreciable effect on joint strength, but pressure should be held for a time after heating. *From authors' summary.*

2942. HARTSHORN, L. **Radio-frequency heating.** George Allen & Unwin Ltd., Ruskin House, Museum St., London. 1949. pp. 237. 90 refs. Price 21*s*. P.R.

Consists of chapters on: generators; principles of induction heating; applications of induction heating; principles of dielectric heating; applications of dielectric heating; and notes on cost and history; and includes information on the theory and practice of radio-frequency heating in wood drying and gluing. [Cf. *For. Abstr.* 11 (No. 2809).]

2943. LACEY, P. M. C. **Nomograms for dielectric heating calculations and their construction.** For. Prod. Res., Lond. 1949. pp. 6 + 3 photos, 5 gphs. 15 refs. P.R.

Gives charts relating the following quantities: (1) thermal calculations: (*a*) rate of temperature rise, power concentration, specific heat, moisture content of timber, and density; (*b*) power concentration, power and volume; (*c*) rate of temperature rise, temperature rise, and time; (2) resonance calculations: frequency, inductance, capacitance, dielectric constant, ratio of area to thickness, addition of inductances in parallel, and addition of capacitances in series; and (3) relation of voltage and power: power concentration, frequency, voltage gradient, and loss factor.

2944. POUND, J. **Some notes on the technique of radio-frequency heating.** *Wood* 15 (1), 1950 (14–8).

2945. CUNNINGHAM, J. B. **Application of radio-frequency tooling.** *Repr.* from *Proc. U.S. For. Prod. Res. Soc., 1948* 2, [1949] (260–70). P.R.

Describes methods of designing and making tools for manufacture of hollow-core flush doors, bent plywood furniture, etc.

2946. STANLEY, G. W. **How thin strips at right angles to one another are profitably assembled using high frequency.** *National Hardwood Magazine, Memphis* 23 (5), 1949 (62, 64, 68–9). P.R.

2947. STANLEY, G. W. **How high frequency is used in making luggage cores.** *National Hardwood Magazine, Memphis* 23 (8), 1949 (58–62). P.R.

2948. Kunstharz-Kaltverleimung. **[Cold gluing with synthetic-resin glues.]** *Holztechnik* 29 (1; 2), 1949 (6–9; 31–3). [G.] P.R.

2949. RINKER, R. C., REINHART, F. W., and KLINE, G. M. **Effect of pH on the strength of resin bonds.** *Wartime Report, National Advisory Committee for Aeronautics, Washington* ARR No. 3J11, 1943. pp. 19. *Chem. Abstr.* 42 (18), 1948 (7097). P.R.

Birch plywood bonded with urea formaldehyde and phenolic resins is affected by the pH: pH values below which optimum strengths are not obtained and deterioration by ageing becomes appreciable, are between 3·8 and 4·6 for urea resins and 3·1 and 3·6 for phenolic resins. Delamination of Birch plywood made with urea-formaldehyde resins, becomes easier with lower pH; with phenolic resins, delamination is not affected. At a pH value of 3·1 or less, phenolic-resin plywoods are less flexible than those of pH 3·6 or more.

2950. BLOMQUIST, R. F. **Effect of alkalinity of phenol- and resorcinol-resin glues on durability of joints in plywood.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1748, 1949. pp. 11 + 13 tbls. P.R.

The durability of Yellow Birch and of Douglas Fir plywood bonded with a hot-press phenol-resin, an intermediate-temperature-setting phenol-resin, and a room-temperature-setting resorcinol-resin glue, each formulated with varying amounts of caustic soda up to an amount that made glue spreading impracticable, has been investigated over a 2-to-3-year period under each of 4 exposure conditions. These included exposure at approximately normal room conditions, at an elevated temperature and low humidity, at a high humidity at room temperature, and to a repeating cycle of high and low humidities. In general, the specimens exhibited typical behaviour characteristic of well glued joints made with the more

durable glues under the same test conditions. Under some exposure conditions, no significant relationship was found between the amount of alkalinity and durability. There was evidence, however, that the most alkaline hot-press phenol-resin glues were somewhat more destructive to the wood than were the less alkaline glues when specimens were tested wet after 3 years of exposure at the high temperature. Further, the two most alkaline hot-press phenol formulations were most affected in joints in Birch plywood when subjected to the cycles of high and low humidities, in which case the adverse effects noted appeared to be due mainly to damage to the glue, although there were some indirect indications that the wood also was affected. The amounts of alkali incorporated in some of these formulas, however, were much higher than are known to be incorporated in any currently used resin glues. The determination of film pH does not appear to be an adequate method of distinguishing the excessively alkaline glues that appeared to damage the wood under certain conditions, from less alkaline glues that were sufficiently durable in these tests. *From author's summary.*

2951. NARAYANAMURTI, D., and RANGANATHAN, V. **A simple method of curing resin adhesives.** *Indian For. Leafl.* No. 104, 1948. pp. 3 + 2 photos.

The method described is designed to combine lamination and preservative treatment into a single process. The material to be laminated is given 2 or 3 coats of adhesive, allowed to air-dry and then assembled in clamps. The assemblies are then put in an open tank and submerged in a creosote/fuel-oil mixture; this is heated to 100° C., kept at that temperature for 3–6 hours, and allowed to cool overnight. Tests of adhesion and the degree of penetration gave good results. Laminated sleepers made by the same method and exposed to weathering and attack by fungi and termites, have given encouraging preliminary results.

2952. CZERWINSKI, W. **Assembly gluing for small workshops. 2. Application characteristics and working conditions.** *Wood* 14 (12), 1949 (375–5).

Methods of applying pressure, and curing temperatures and times for urea-formaldehyde, cold-setting glues.

2953. PERRY, T. D. **How much pressure in gluing?** *Wood Prod.* 54 (11), 1949 (35–9).

Discusses the pressure necessary for different types of gluing and presents a table of pressure ranges suitable for various kind of construction.

2954. PERRY, T. D. **Proper moisture content for gluing.** *Wood Prod.* 55 (1), 1950 (27–30).

2955. OWENS, J. M., and BISHOP, A. H. **How to cure the production headache of bleed through.** *Veneers & Plyw.* 43 (10), 1949 (16, 18–9). P.R.

The causes and cure of bleed-through of glue in veneering are discussed. The moisture content of the veneers should be between 5 and 10%, as excess moisture thins the glue and increases its flow. Pore size influences the flow of glue; *Khaya ivorensis* with a pore diameter of 180–240μ is more subject to bleed-through than *Swietenia* spp. (110–170μ). Sapwood is a better conductor of liquids than heartwood, and the latter should be specified when it is important to avoid bleed-through. The glue line should be kept even, and as low as is consistent with a good bond, the mix should be fairly thick, and for resin glues extended with wheat flour, 15–20% of the normal wheat-flour extender should be replaced by an inert nut-flour filler. If bleed-through seems to be developing, an increased assembly time may allow water in the glue to evaporate. More rapid curing during hot pressing may reduce the flow; the actual pressure is not normally a factor. The faces of the veneer should be sanded lightly, or so much wood may be removed as to expose the glue. Bleed-through may be camouflaged by dyeing the glue. When its prevention is essential, it may be desirable to fill up the pores by glue-sizing the faces of the veneers.

2956. SCALES, G. M. **The edge-to-edge splicing of veneers. 1. Methods and glues.** *Wood* 15 (2), 1950 (47–51).

2957. MOSER, H. C. **Edge-gluing engineering and production systems.** *Repr.* from *Proc. U.S. For. Prod. Res. Soc., 1948*, 2, [1949] (257–9). P.R.

2958. MARRA, A. A. **The technology of the glue line in the edge-gluing of lumber.** *Repr.* from *Proc. U.S. For. Prod. Res. Soc., 1948* 2, [1949] (245–56). P.R.

2959. **Drying and conditioning glued joints.** *Rep. U.S. For. Prod. Lab., Madison*

No. *D*475 (revised) 1948. pp. 4 + 3 tbls. P.R.

33.17. Sawmilling and Machine Planing

See also *For. Abstr.* 11 (Nos. 2824–5).

2960. Schaible, R. **Investigations about downward and upward cutting.** *Transl. For. Prod. Aust.* 1949. pp. 4. Transl. by W. Kaumann from *Holztechnik* 29 (2), 1949 (28–9). P.R.

The different effects of downward and upward cutting in sawmilling are discussed and the differences in wood surface and in the shape of the chip are described and shown in photographs. Downward cutting gives an 'organic' cut without tearing of the fibres, but produces a rougher surface and deeper corrugation of the wood; this can be offset by a slower rate of feed.

2961. **Sawmill engineering issue.** *Lumberm.* 77 (1), 1950. pp. 136.

A special number containing numerous articles on sawmill equipment and methods.

2962. Kantorovich, L. V. Podbor postavov, obespechivayushchikh maksimal'nŷ vŷkhod piloproduktsii v zadannom assortimente. [**The choice of gang-saw blade spacings producing maximum yield of sawn timber in a given assortment [of sizes].**] *Lesn. Prom.* 1949 (7; 8), (15–17; 17–19). 1 ref. [Russ.]

Proposes a 'mathematically accurate and at the same time sufficiently elementary and practicable method' of solving the problem by calculation, detailing the mathematical procedure and giving examples of working, but omitting for lack of space the full proof.

2963. G. D. Vlasov. Uproshchennŷ metod rascheta neobkhodimŷkh razmerov sŷr'ya po spesifikatsiyam pilomaterialov. [**A simplified method of calculating the dimensions of logs necessary to produce sawn timber to given specifications.**] *Lesn. Prom.* 1949 (11), (20–3). [Russ.]

Develops a series of mathematical equations, together with tables of necessary coefficients and several examples of the working, for rapid estimation (with an accuracy of 3–5%) of the relations between average log dimensions and the sawn timber, by size and quantities of each size, that can be produced from the logs.

2964. Leão, A. E. de, Jr. Aproveitamento racional da madeira. [**Rational utilization of timber.**] *Brasil madeireiro* 4 (40), 1948 (8–12). [Port.]

Discusses sawmill yields from Pine [*Araucaria* sp.], and presents calculations of the number of trees necessary to give a certain monthly production, and the details of a sawmill recovery study on logs of different dimensions.

2965. Souza, P. Ferreira de. Grandes e pequenas serrarias. [**Large and small sawmills.**] *Brasil madeireiro* 4 (44–6), 1948 (9–17; 13–22; 9–18). [Port.]

Describes methods of logging and transporting timber, and ways of estimating the cubic content of logs, and discusses various types of sawmilling machinery, all with special reference to Brazilian practices.

2966. Hyler, J. E. **Wood-working saw blades.** *Sth. Lumberm.* 178–9 (2229; 2231; 2233; 2235; 2239; 2242; 2243; 2245; 2247), 1949 (85, 88, 90, 92, 94; 70, 72; 102, 104; 82, 84; 76, 79–80; 78, 80–1; 64, 66; 74, 76; 70, 72).

2967. Gulowsen, K. T. Om valg av sagbruksmaskiner. [**The choice of sawmill machinery.**] *Norsk Skogind.* 3 (11), 1949 (283–7). [Nor.e.] P.R.

Costs and volume of production per man-hour and the cost of installing and maintaining equipment in typical Norwegian sawmills are compared, the figures obtained being given in graphs and tables. Recommendations are made for equipment and labour for mills of different sizes and volume of production. Where annual outturn is less than 400,000 bd. ft., the traditional sawbench with double circular saw and a crew of 6 is most economical in spite of the poor recovery of timber. It is suggested that in all mills it would pay to increase timber recovery even at the expense of output per man-hour, and investigations on the relationship between speed and timber recovery in sawmills of different types are recommended.

2968. Bell, G. E. **The lumber waste problem. Discussion concerning the effect of a bull-edger on lumber recovery, also the effect on sawing time.** *Timber of Canada* Jan., 1950 (31–3, 64).

Gives the results of a study made at the Forest Products Laboratory, Ottawa, on 646

logs, 208 of which fell into diameter classes of 12, 13 and 14 in. The normal procedure of the mill was (1) to convert large logs entirely on the band headsaw, and (2) to 'slab' smaller logs on the band headsaw and then convert them on a 'bull-edger' (a machine containing a number of fixed circular saws). Of the intermediate classes, some were sawn by method (1) and some by method (2). Comparisons of recovery and time required are shown in tables and graphs. In the intermediate classes recovery was greater with method (1); method (2), from the recovery standpoint, is only suitable for the 7- to 8-in. diameter classes. Method (2) was quicker, but a comparison of costs showed that the higher output from method (1) more than offset the longer time required. Thus, the band headsaw alone yielded greater profit per bd. ft. of lumber, though operating the 'bull-edger' at the same time increased the productive capacity of the mill as a whole, and enabled it to realize a greater net profit per day.

2969. WEBB, B. E. **Economy in sawmilling.** *Malay. Forester* 13 (1), 1950 (14–20).

Suggests economies in timber production (1) by mechanization of logging and haulage, (2) by substituting band saws with a kerf of $\frac{1}{8}$ in. for circular saws with a kerf of $\frac{7}{16}$ in., and (3) by working up slabs and offcuts into small dimensional stock.

2970. **Perfects method of reducing bandmill speed to cut hard and frozen logs.** *Lumberm.* 76 (10), 1949 (82).

Describes and illustrates a secondary magnetic contactor with push-button control (operated by the sawyer), by which the speed of the head saw can be reduced by 15%. The equipment was devised and used by the Winton Lumber Co., Martell, near Jackson, Calif.

2971. [LOTTE, KELLER, and POUZEAU.] La scie circulaire. **[The circular saw.]** *Broch. tech. Lab. d'Essai des Bois* No. 8, 1949. pp. 58. [F.] P.R.

2972. **The circular saw [: advice on its maintenance.]** *Timb. Tr. J.* 192 (3827), 1950 (258–9).

2973. LE CAM, L. Scie circulaire multilame automatique. **[A circular saw with multiple blades.]** *Fr. Patent* No. 945,334, May 2, 1949. [F.] *Abstr.* in *Rev. Bois Appl.* 5 (2), 1950 (34).

2974. TURNBULL, R. F., and COLWELL, S. J. **Docking saws.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 176, 1949 (1–2).

Describes the pendulum-type cross-cut saw, the uprising and horizontal disappearing saws which can be swung manually or by power, the automatic tumbler saw for cutting short lengths, and the multiple trimmer and slasher saws for cutting waste into firewood.

2975. COLWELL, S. J., and TURNBULL, R. F. **Docking saw gauges.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 177, 1949 (4).

2976. COLWELL, S. J. **Saw bench gauges.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 175, 1949 (4).

Describes the Trewhella and the pin or peg gauges, both popular in Australian mills.

2977. HYLER, J. E. **How to select a jointer facing with the handfeed jointer.** *National Hardwood Magazine, Memphis* 23 (5), 1949 (35–6, 47). P.R.

2978. PETIPAS, J. Affûtages et affûteurs. **[Tool sharpening and sharpeners.]** *Rev. Bois Appl.* 5 (3), 1950 (3–6). 6 refs. [F.]

Discusses differences in the maintenance of circular saws (for cutting metal or wood), planes, and moulding machines.

2979. TELFORD, C. J. **Labor-saving devices for small mills.** *Sth. Lumberm.* 178 (2235), 1949 (53–4, 56, 58).

Brief illustrated descriptions of a number of devices, mostly concerned with the transfer of materials.

2980. KENNEDY, W. B. **Fast methods of handling lumber.** *Sth. Lumberm.* 180 (2251), 1950 (68).

Describes: (1) a chain conveyor for loading lumber. The chains are mounted on 'rafter-like' timbers slanting upwards at an angle of 45–90°. The whole unit, with a small petrol-driven motor, is mounted on a truck, so that it is completely mobile. (2) A method of stacking lumber on a trailer, so that a chain can be passed around individual piles, for unloading quickly by a crane or hoisting equipment.

2981. KARLSEN, O. Bruk av gaffeltrucks til transport og stabling ved sagbruk. [[The

advantages of] using fork trucks for transport and stacking in sawmills.] *Norsk Skogind.* 3 (12), 1949 (324–5). [Nor.] P.R.

33.3. *Chemical Treatment*

Use of Wastes

See also *For. Abstr.* 11 (Nos. 2769 et seq., 3000–1, 3048–9).

2982. PEARL, I. A., and WISE, L. E. (to Institute of Paper Chemistry). **Phenolic materials from lignin.** *U.S. Patent* No. 2,482,594, Sept. 20, 1949. *Chem. Abstr.* 43 (22), 1949 (9446–7). P.R.

Wood chips and sawdust treated with $NaClO_2$ and glacial AcOH at 70–80° C., followed by removal of the ClO_2 by aspiration, precipitation by treatment with H_2SO_4, and ether extraction, gave a total of 18·5 parts of materials such as phenols, 6-chlorovanillin, and neutral oils. Isolated softwood soda lignin subjected to a similar treatment with $NaClO_2$ gave the same products and similar yields. Isolated lignins from softwoods treated with $NaClO_2$ yielded mostly derivatives of guiacol, and from hardwoods, derivatives of guiacol and of syringyl alcohol.

2983. ADLER, E., and HÄGGROTH, S. Über die Bildung von Vanillin und Acetaldehyd aus Lignin und Lignosulfonsäure mittels Alkali. **[The formation of vanillin and acetaldehyde from lignin and lignosulphonic acid by alkali treatment.]** *Acta Chemica Scandinavica, Copenhagen* 3 (1), 1949 (86–8). 9 refs. [G.] [Institut für Holzforschung, Stockholm.] O.R.S.

2984. YORSTON, F. H., and PICHETTE, A. H. **Studies on sulphite waste liquor. I. The action of anion exchanges. II. The extraction of sugars. III. A note on the determination of methoxyl.** *Pulp Paper Mag. Can.* 50 (12), 1949 (108–14). 13 refs. [Pulp and Paper Research Institute of Canada.]

2985. KRATZL, K., and KHAUTZ, I. Über das Bauprinzip der Seitenketten der Ligninsulfosäuren. I. Hydrolyseversuche an Modellsubstanzen. II. Hydrolyseversuche an Ligninsulfosäuren, Ligninpräparaten und Lignin. III. Über den Anteil der hydrolysierbaren Ligninsulfosäure in der Sulfitablauge. **[The structure of the side-chains of lignosulphonic acids. I. Hydrolysis experiments on model substances. II. Hydrolysis of lignosulphonic acids, lignin preparations, and lignin. III. The fraction of hydrolysable lignosulphonic acid in sulphite liquor.]** *Monatshefte für Chemie, Wien* 78 (5/6), 1948 (376–410). 77 refs. [G.g.] P.O.

2986. BRUNES, B. Förbränning av sulfitlut. **[Burning sulphite liquor.]** *Svensk Papp-Tidn.* 52 (21), 1949 (529–32). [Sw.e.g.] P.R.

[Report by the Sulfitlutindunstningskommitté at a meeting of the Svenska Pappers- och Cellulosaingenjörsforening, March 12, 1949.]

Waste sulphite liquor, evaporated to a solid content of about 50% or dried to a powder, is a fuel with a high content of S and ash. The S may cause formation of SO_3 in the flue gases and a high dewpoint. The ash may, exceptionally, cause considerable deposits on the heating surfaces; most of the ash can be removed in mechanical dust separators. It is not difficult to get good results from burning the liquor in dry powder form. For combustion of liquor with a 50% solid content it is necessary either to add fuel with a high calorific value or to prevent the walls of the furnace from cooling, if a sufficiently high furnace temperature is to be maintained. Even when this is done, loss of combustible matter in the ash has hindered good results. *From author's summary.*

2987. JUVONEN, V. V. **Production of tall oil in Finland.** *Paper Tr. J.* 130 (1), 1950 (27–9). P.R.

33.32. Pulp and Paper Manufacture. Wallboards. Plastics

2988. Pasta y papel. **[Pulp and paper.]** *Montes, Madrid* 5 (30), 1949 (528–40). [Span.]

Presents and discusses statistics for world production of pulp and paper from 1937 to 1947.

2989. ACOSTA SOLÍS, M. Algunas consideraciones sobre la futura industria del papel en el Ecuador. **[The future paper industry in Ecuador.]** *Publicación, Departamento Forestal del Ecuador, Quito* No. 5, 1949. pp. 11. [Span.]

Suggests some suitable native species, and discusses possible areas for the development of a pulp and paper industry.

2990. JAYME, G. Aus der Zellstoff- und Papier-Industrie Australiens. **[The Australian pulp and paper industry.]** *Papier, Darmstadt* 3 (11/12), 1949 (201–15). 26 refs. [G.] L.S.

Discusses, on the basis of a personal visit, the growth, and chemical and physical properties of Australian *Eucalyptus* woods, processes used by the Australian pulp mills, the research institutions and their work, other chemical industries using wood, the new plantations of conifers, and their use in the pulp and paper industry.

2991. HILL, E. L. **Pulp and paper.** *Repr.* from *Reports on the Progress of Applied Chemistry, Cambridge* 33, 1948 (1949) (322–37). 109 refs. [Ministry of Supply.] P.R.

Summarizes world literature during 1948 on developments in: raw materials, pulp production, paper making and testing and analysis.

2992. BORGIN, K. Celluloseforskning i U.S.A. **[Cellulose research in the U.S.A.]** *Norsk Skogind.* 3 (11), 1949 (276–82). 4 refs. [Nor.e.] P.R.

Lists the university, independent, Government and industrial research laboratories working on cellulose and gives brief notes on the kind of work done at each.

2993. CAMPBELL, W. B. **The surfaces of cellulose [: with reference to cellulose-water relationships].** *Tappi* 32 (6), 1949 (265–71). 16 refs. [Pulp and Paper Research Institute of Canada, Montreal.] L.S.

2994. BARKAS, W. W. **The sorption and swelling of cellulose under natural and imposed restraints.** *Proceedings of the Technical Section, Paper Makers' Association of Great Britain and Ireland, London* 28, 1947 (189–216). 8 refs. L.S.

2995. JÖRGENSEN, L. **Hydrolysis and fine structures of cotton and wood pulp fibres.** *Acta Chemica Scandinavica, Copenhagen* 3 (7), 1949 (780–2). 9 refs. [E.] [Billerud Research Laboratory, Säffle, Sweden.] O.R.S.

33.32.1. *Pulp Manufacture*

See also *For. Abstr.* 11 (Nos. 2769 et seq., 2982–7).

2996. JAYME, G. Beitrag zur Biostruktur ungebleichter Zellstoffe. **[On the biological structure of unbleached pulps.]** *Melliand Textilberichte, Heidelberg* 28 (4), 1947 (125–9). 17 refs. [G.g.] [Institut für Zellulosechemie der Technischen Hochschule, Darmstadt.] L.S.

Compares the changes in colour, swelling properties and degree of polymerization of coniferous sulphate and sulphite pulps caused by removal of lignin with $NaClO_2$.

2997. HERRENT, P., and GOVAERTS, R. Polydispersité de la cellulose de la pâte de bois. **[[A method of determining] the polydispersity of cellulose in wood pulp.]** *Journal of Polymer Science, New York* 4 (3), 1949 (289–307). 18 refs. [F.f.e.g.] O.R.S.

[Centre de Recherches de la Fabelta, S.A., Union des Fabriques Belges de Textiles Artificiels, Tubize, Belgium.]

2998. HÄGGLUND, E., and WEBJÖRN, B. Über die Härte von Zellstoffen. II. **[On the hardness of pulp. II.]** *Svensk PappTidn.* 52 (24), 1949 (607–9). [G.e.sw.] (*Meddelande från Cellulosaindustriens Centrallaboratorium* No. 60.) P.R.

Further research [cf. *For. Abstr.* 11 (No. 472)] confirms that the ease of beating sulphite and sulphate pulps is not dependent on their lignin content.

2999. **Weight-volume measurements of pulpwood and chips.** (Revision of Tappi Tentative Standard T7 p. 45). *Tappi* 32 (8), 1949 (61*A*–67*A*). 2 refs. L.S.

A dry and an immersion method are described for determining the volume of wood and weight of dry wood per laboratory-racked cord, and methods are given for comparing the values obtained with commercial scaling of pulpwood. A method for determining the weight of dry wood per cu. ft. of chips is also described. [Cf. *For. Abstr.* 11 (No. 3380).]

3000. TAMBLYN, W. G. **Flash drying of bark at the Great Lakes Paper Company Limited.** *Pulp Paper Mag. Can.* 50 (12), 1949 (101–7).

Describes the hogs, flash-drying equipment and dutch ovens, used by the company for processing bark for fuel, and burning bark and wood waste.

3001. HARRIS, D. W. **The combined firing of coal and wood refuse.** *Paper Mill*

News, Philadelphia 72 (10), 1949 (10–3). P.A.T.R.A.

Describes, with illustrations, different types of furnaces for burning coal with wood and bark wastes, and tabulates the result of bark analyses of Douglas Fir, Cedar, Lodgepole Pine, White Fir, Hemlock, Spruce and Redwood.

3002. SWIFT, F. H. (to Crown Zellerbach Corporation, San Francisco). **Hydraulic barker.** *U.S. Patent* No. 2,480,889, Sept. 6, 1949. *Abstr.* in *Paper Tr. J.* 129 (25), 1949 (32). P.R.

3003. SHAW, E. C. (to Allis-Chalmers Manufacturing Company, Milwaukee, Wis.) **Log debarking machine.** *U.S. Patent* No. 2,490,165, Dec. 6, 1949. *Abstr.* in *Paper Tr. J.* 130 (2), 1950 (34–5). P.R.

Consists of a log-rotating roll with a gap intermediate on the longitudinal surface, with means to hold a barking tool in position in the gap.

3004. DEFIEUX, O. T. **Pulpwood handling at Camas.** *Paper Tr. J.* 129 (25, 1949 (25–8). P.R.

Machinery described includes: a bridge crane with 2 independent hydraulically operated grapples for handling bundle-type rafts; a hydraulic barker; a chipper and auxiliary equipment; all of which are in use at the Camas division of the Crown Zellerbach Corporation.

3005. WALLER, A. Rationalisering inom pappers- och cellulosaindustrien : råvaror. [**Rationalization in the paper and pulp industry: raw materials.**] *Svensk Papp-Tidn.* 51 (14), 1948 (307–16). [Sw.g.e.] P.R.

The importance of reducing loss of wood and of using high-grade wood for high-grade pulp is stressed. Improvements in Sweden during recent years in floating and storing pulpwood have reduced loss by sinking and decay, and given wood of a better quality. Labour shortages have made it necessary to float logs unbarked in some parts of the country; this is undesirable for sulphite pulpwood because the surface layer gets impregnated with tanning substances which prevent it from being properly cooked. Changing from knife barkers to barking drums in the mills gives a saving in pulpwood of 10–15% and few mills now use the former method. The possibility of getting clean unbleached pulp is, however, somewhat reduced when the surface of the log is not removed. Thorough wetting of the logs before friction barking facilitates bark removal. Modern chippers give uniform chips and smaller loss in screening and cooking. The possibilities of increasing pulp yield in the pulping process without reducing pulp quality are limited. Short fibres which pass through the screens are largely ray fibres of poor colour and very high resin content. The demand for rayon pulp of low viscosity is best met by sufficient ageing of the alkali cellulose to bring about pulp degradation. The economy of other raw materials of the industry is discussed.

3006. BARROW, H. B. **Chipper drives.** *Paper Tr. J.* 129 (25), 1949 (28–9). P.R.

Factors affecting the chipper drive are load requirement and the type of motor. The maximum horse-power requirement can be calculated from the chipper rate in cu. ft./sec. (dependent on cross-sectional area of the log, chip length, number of knives, and speed of chipper in revs./min.) and the power required for chipping the particular species. The h.p./cu. ft./sec. required for 4 species is given. Types of motor are described.

3007. MURTO, J. O. Selluloosapuun lastutus III. [**Chipping of pulpwood III.**] *Papp. Trävarutidskr. Finl.* 31 (20), 1949 (361–70). 8 refs. [Fi.e.] P.R.

[Cf. *For. Abstr.* 10 (No. 443); 11 (No. 461).] Results of comparative chipping tests on different species are given in graphs and tables. Results for Spruce confirm the fact that moisture content and chip length have an important influence on chipping results. There is greater variation in the thickness of tangential than of radial chips. Tangential chips from slowly growing Pine from north Finland were finer than those from Pine from the south. It is improbable that these differences in thickness and those between Pine and Birch chips are of much significance in the pulping process. Increase in wood density added considerably to the chipping work required per solid cu.m. of wood. No chipping fines were formed from undecayed hardwoods at moisture contents above saturation point of the cell walls when 'service-sharp' knives were used. The number of chipping fines from Pine decreased with increasing density of the wood. Further research on the chipping of Spruce and on the

effect of wood strength on chipping is recommended. Microphotographs show the curling caused by chipping, especially noticeable in the tracheid walls of early wood of Pine. This curling may be responsible for variations in strength of sulphate pulp. *From author's summary.*

3008. ZASADA, Z. A., and RICHARDSON, C. A. **Logging and pulping Black Spruce thinnings.** *Tappi* 32 (9), 1949 (393–6). 2 refs. L.S.

Logging costs for Black Spruce [*Picea mariana*] thinnings are higher than those for logging mature stands with high volume per acre, but are not impracticably high in the present conditions of supply and demand for Spruce pulpwood. Mill studies show that the pulp yield and quality from small wood were little different from those from wood of normal size. The small wood requires more handling in grinding and barking but the extra handling is not sufficient to slow down the processing operations. Most of the wood produced from thinnings will meet present specifications. In this study, 54% of the volume was in sticks of 4 in. top diameter and larger. Results of the study are tabulated.

3009. [ATCHISON, J. E.] **Present and potential use of hardwoods in western Europe's pulp-paper industry.** *Paper Tr. J.* 129 (23), 1949 (18, 20, 22). P.R.

The following are the findings for the different countries: (1) United Kingdom—some waste hardwood is being used for insulating and hardboard; the mill uses a furnish of 50% Asplund fibre and 50% groundwood, both of waste wood, and produces about 28 metric tons per day; (2) Scandinavia—Birch used for a sulphate-type pulp is in demand and sells at $10 below coniferous pulp; (3) Western Germany—Beech is used for the manufacture of dissolving pulp by the sulphite and sulphate processes; little use is at present made of hardwoods for paper pulp; (4) France—total French production of hardwood pulp is 30,000 metric tons a year; of this, 20,000 tons represents bleached soda pulp from Chestnut chips, after the extraction of tannin; the pulping methods are described; one mill is cooking unbarked Poplar by the neutral sulphite semi-chemical process; (5) Austria—one mill is producing about 1,500 metric tons a month of dissolving pulp from Beech; the poor quality of this pulp is attributed to inadequate cleaning of the wood and of the finished pulp; no paper pulp is made from hardwoods; it seems probable that the cultivation of Poplar for use as pulpwood could be very successful; (6) Italy—principal use for hardwoods (mainly Poplar) is for the manufacture of mechanical pulp for newsprint and other printing papers; (7) Netherlands—there has been no important development in the use of hardwoods for pulp.

3010. GRAMACHO, D. Pasta de celulose - contribuição ao seu estudo. **[Contribution to the study of cellulose pulp.]** *Revista de Química Industrial, Rio de Janeiro* 18 (201), 1949 (12–4). 3 refs. [Port.] [Instituto de Química Agrícola e Tecnologia da Bahia.] L.B.A.

Includes a list of 20 woody species from the forests of southern Bahia, with their cellulose content. Imbiruçú [*Bombax endecaphyllum*] and Sumaúma [*Ceiba pentandra*], with a total content of 71·8% and 54% respectively, seem, with *Eucalyptus*, the most promising species to cultivate for cellulose production. The plant Caroá (*Neoglasiova variegata*), with a minimum cellulose content of 60%, can also be included among the useful pulping species.

3011. BEE, E. **Pulping of hardwoods in Australia.** *Paper Industry and Paper World, Mount Morris, Ill.* 31 (3), 1949 (343–5). L.S.

Australian hardwoods chiefly used for groundwood pulp are *Eucalyptus regnans* and *E. obliqua*. *E. regnans* was the only species tested in which the bond between the fibres was weaker than the fibres themselves; in other species in which the bond is as strong as the fibres, the fibres tend to break during the grinding process. The use of equipment in which the pulp does not come into contact with iron, prevents tannin discoloration, giving paper with 83% brightness as against 58–65% from the use of ordinary equipment. Colour is further improved by treating the groundwood with zinc-hydrosulphite solution. Site and altitude affect fibre quality, and logs are carefully sorted before pulping. The plant and methods of the mill of the Australian Newsprint Mills Pty. Ltd. at Boyer, Tasmania, are described.

3012. HAAS, H. Zusammensetzung des Cellulose- und Holzpolyosen-Anteils verschiedener Laub- und Nadelhölzer. **[Composition**

of the cellulose and wood polyose constituents of various deciduous and coniferous woods.] *Repr.* from *Makromol. Chem.* 2, 1948 (217–26). 21 refs. [G.g.] [Forschungslaboratorium der Zellstoffabrik Waldhof, Wiesbaden-Kostheim.] P.R.

Holocelluloses from 15 hardwoods and 5 softwoods were fractionated into: (1) constituents of low molecular weight (polyoses) with average degree of polymerization (D.P.) of up to 150, forming 13–30% of the wood; (2) constituents of high molecular weight (cellulose), D.P. over 1,000, 40–55% of the wood; and (3) for some species an intermediate fraction, D.P. 150–1,000, forming not more than 14% of the wood. Tests on woods of different origin showed that the differences in the fractions are characteristic for different species. Tabulated results of an analysis of the polyose fractions show: for hardwoods, 55·5–69·7% pentosans and uronic acids, and a residual fraction mainly glucans; for softwoods 18·6–38·5% pentosans and uronic acids, 25·3–43·9% mannans, and a residual fraction mainly glucans. The cellulose fraction contained 1·5–3% of foreign substances, consisting of xylose and glucuronic-acid substances; these were not removed from the cellulose molecule by alkali or partial hydrolysis in conditions sufficient for the hydrolysis of wood polyoses, a proof that these groups form part of the cellulose molecule. Mannans in the cellulose fraction of softwood holocellulose were removed by the hydrolysis. Foreign groups in the cellulose fraction decreased with increasing D.P. The size of the cellulose fraction determines the yield, and the proportion of foreign groups present, the purity of the pulp; of the hardwoods examined, Poplar spp. approach most closely to Beech in both respects, and are most suitable for pulp.

3013. Ross, J. H. **The effect of hemicellulose content on the physical properties of pulp.** *Pulp Paper Mag. Can.* 51 (1), 1950 (93–8). 15 refs.

Concludes that the hemicellulose and pentosan contents in themselves do not affect pulp properties; it is the manner in which a particular pentosan content or hemicellulose fraction of the pulp is arrived at during the digestion which affects papermaking.

3014. Ratliff, F. T. **The possible correlation between hemicelluloses and the physical properties of kraft pulp.** *Tappi* 32 (8), 1949 (357–67). 33 refs. [Johns-Manville Research Laboratories, Manville, N.J.] L.S.

Five bleached pulps from *Pinus caribaea* were examined for their physical and chemical properties. In general, strength properties increase with yield, and, less regularly, with the hemicellulose content. The hemicelluloses appear to enable a high specific surface and bonding area to be developed during beating, without much decrease in fibre strength. Analyses show that even in a very raw cook an appreciable amount of the α-cellulose present in the wood is destroyed or degraded, and during mild kraft cooking potentially important carbohydrate material is lost.

3015. Randolph, E. E., and Hofmann, J. G. **Investigation of the effect of 'red heart' in Pond Pine with reference to pulpwood.** *Abstr.* in *J. Elisha Mitchell sci. Soc.* 62, 1946 (136–7). L.S.

Microscopic studies of *Pinus rigida* var. *serotina* wood affected by *Fomes pini* indicated that the lignified tissues are attacked first. Preliminary sulphate pulping tests of wood in different stages of infection confirmed this finding. Up to a certain stage of infection the weight and volume of pulp is appreciably affected though the strength compares favourably with that of pulp from sound trees.

3016. Martin, J. S. **Sulfate pulping of logging and sawmill wastes of old-growth Douglas-Fir and of certain associated species.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1747, 1949. pp. 10 + 8 tbls. P.R.

Pulping experiments were carried out on logging and sawmill waste consisting of Douglas Fir, either sound but from suppressed trees and unsuitable for conversion, or in various stages of decay by *Fomes pini*, and of the species associated with the Douglas Fir—Mountain Hemlock (*Tsuga mertensiana*), Noble Fir (*Abies procera*), and Lodgepole Pine (*Pinus contorta* var. *latifolia*). Physical and chemical tests were carried out on all the samples before pulping. All the species were pulped satisfactorily with the normal amounts of chemicals. Pulps from the decayed wood (incipient, intermediate and advanced decay) were equal in yield and had a lower bleach requirement than pulps from the sound wood. The following

conclusions are drawn from tests of pulp strength: (1) pulp from sound old-growth Douglas Fir might be slightly lower in bursting and significantly higher in tearing strength than Southern Pine sulphate pulp; (2) the bursting strength of decayed Douglas Fir pulp will be lower than that of sound wood pulp, that of pulps from wood in the advanced stages of decay being about 75% that of Southern Pine pulp; (3) the other 3 species will give pulp of excellent bursting and fair tearing strengths; (4) sulphite pulp from a furnish of 70% Douglas Fir, 10% Mountain Hemlock, 10% Noble Fir and 10% Lodgepole Pine will have good bursting and excellent tearing strengths and be of higher quality than pulps from sound Douglas Fir alone; and (5) pulp of the quality of that from sound Douglas Fir would be produced from mixtures of wood in which 2·6 parts of wood with incipient, 1·7 parts with intermediate or 1·2 parts with advanced rot are mixed with 1 part of wood of any of the associated species, Mountain Hemock, Noble Fir and Lodgepole Pine.

3017. STEINMETZ, F. H., HILBORN, M. T., and HSU, C.-Y. **Effect of differential felling and storage upon the quality and yield of paper pulp from Birch wood.** *Abstr.* in *Phytopathology* 40 (1), 1950 (26).

In 1941, sound Paper Birch [*Betula papyrifera*] trees were felled in March, July, and September, and the July-felled wood was divided into barked and unbarked portions. The wood was stored in place in cordwood style. From samples taken each autumn for 4 successive years, paper pulp was made. The yield, based upon dry weight, remained relatively constant until advanced stages of decay were reached. September-felled wood retained its superiority over that felled in March or July. At the end of 4 years, July-cut samples of barked wood had lost 7% of their original pulp value, while the loss for unbarked wood was 21% for March-cut, 20% for July-cut, and 14% for September-cut samples. To test pulp quality, hand sheets of pulp were prepared from the original samples of trees felled in 1941 in March, July and September, and compared with pulp made from barked and unbarked samples taken from the woodlot in Feb. 1949. These tests showed that barked Birch produced good-quality pulp, while Birch wood stored with bark on gave a very low yield and decidedly inferior pulps after 8 years of woodlot storage. [Cf. *For. Abstr.* 10 (No. 2656).]

3018. PIGMAN, W. W., and CZELLAK, W. R. **A study of the origin of the kraft colour.** *Technical Association Papers, Technical Association of the Pulp and Paper Industry, New York* 31, 1948 (393–9). 16 refs. [Institute of Paper Chemistry, Appleton, Wis.] P.A.T.R.A.

Results are presented which indicate that the reddish-brown colour characteristic of kraft pulps is derived mainly from lignin. When most of the lignin was removed from the chips by chloriting and the holocellulose thus obtained was subjected to a normal kraft cook, the pulp was light in colour and readily bleached to white; a severe kraft cook of untreated chips gave a similar pulp. Chips chlorited until $\frac{2}{3}$ of the lignin was removed, and then cooked, gave a pulp intermediate in colour between those from Spruce wood and holocellulose. Digestion of thiolignin with holocellulose gave a dark pulp, less easy to bleach than that from holocellulose alone; a similar pulp, rather lighter in colour, was obtained when thiolignin was cooked with chlorited Spruce chips. The addition of pectic substances and sugars to the cook appeared to have no effect on the kraft colour; the dark colour obtained by adding 20% D-glucose to the cook of chlorited Spruce chips was easily bleached. Pulps from Slash Pine, Jack Pine, Aspen and Black Spruce all showed decrease in brightness with increased lignin content. The bleach requirement to obtain a brightness of 65 for a series of Slash Pine kraft pulps of varying lignin contents, plotted against the lignin content, showed a linear relationship; Jack Pine kraft pulps gave similar results. The Slash Pine kraft pulps were much more difficult to bleach than Black Spruce sulphite pulps for a given lignin content.

3019. HÄGGLUND, E. **Sulphidity in the sulphate process.** *Tappi* 32 (6), 1949 (241–5). [Svenska Träforsknings-institut, Stockholm.] L.S.

Considers the part played by Na_2S in the sulphate cook and its connexion with the greater solubility of the lignin, than in a sulphide-free alkali cook.

3020. WELLS, S. D. **Progress in alkaline pulping [a review].** *Tappi* 32 (6), 1949 (35*A*–41*A*). 182 refs. L.S.

3021. ERDTMAN, H. **The sulphonation and delignification of wood by the sulphite process.** *Tappi* 32 (8), 1949 (346–8). [Royal Institute of Technology, Department of Organic Chemistry, Stockholm.] L.S.

The chemistry of the mechanism is discussed.

3022. ERDTMAN, H. **Compounds inhibiting the sulphite cook.** *Tappi* 32 (7), 1949 (303–5). [Kungl. Tekniska Högskolan, Stockholm.] L.S.

Pinosylvin, a phenol extracted from the heartwood of *Pinus sylvestris*, appears to condense with lignin under acid conditions to form products which are insoluble even after sulphonation. Many other Pine heartwoods contain phenolic substances, especially flavones and flavanones belonging to the phloroglucinol series, and are also unsuitable for sulphite pulping. Many tannin-containing woods (e.g. Chestnut and Quebracho) contain the phloroglucinol nucleus and cannot be completely pulped by the sulphite process. A method of pulping Pine heartwood in 2 stages is described.

3023. CHIDESTER, G. H. **Semichemical pulping.** *Paper Tr. J.* 129 (20), 1949 (84–9). 7 refs. P.R.

A mild chemical treatment followed by mechanical refining produces pulps high in yield and strength. Strength values of neutral sulphite semichemical pulps corresponding to yields between 70 and 81% from 29 hardwoods and 10 softwoods are tabulated. Strengths of these hardwood pulps are appreciably higher than those of the sulphite and approach those of the sulphate pulps from the same species. In general the strengths of softwood semichemical pulps are higher than those of hardwoods, but lower than those of chemical pulps of the same species. For some softwoods, strengths of semichemical pulps approach those of sulphite but are below those of sulphate pulps from the same species. Light-coloured woods produce pulps only slightly darker than unbleached sulphite pulp.

Pulp strengths obtained by the use of different cooking liquors are discussed; in general, acid, neutral or alkaline pulps have relationships similar to those from chemical pulps from the same liquors. Pulps can be bleached by stages to 80% brightness values, the yield of bleached pulp varying from 55 to 60% of the wood; there is a great increase in strength, for hardwoods generally higher than that of pulps prepared by other processes, and in some cases equivalent to strong Spruce sulphite. The uses of semichemical pulps from wood and wood waste are discussed and strength values of corrugated and liner boards from pulps from hardwoods and softwoods and wood wastes are tabulated.

3024. JENNESS, L. C., and NYSTROM, G. L. **Sulphite semichemical pulping of chip screenings.** *Technical Association Papers, Technical Association of the Pulp and Paper Industry, New York* 31, 1948 (443–5). 17 refs. P.A.T.R.A.

Pulping tests were made on screenings from a furnish of about 33% Fir and 67% Spruce. Results showing properties and yield of pulp from acids of different strengths and various times of cooking are tabulated. Yields of about 70% semichemical pulp can be obtained by pulping the screenings with acid sulphite liquor for short periods, the time varying inversely with the acid strength. The pulp is suitable for the manufacture of strong wrapper, liner or board, in which colour is of little importance.

3025. KELLER, E. L., and MCGOVERN, J. N. **Neutral sulphite semichemical pulping of Aspen: effect of certain buffering agents.** *Tappi* 32 (9), 1949 (400–5). 10 refs. [U.S. Forest Products Laboratory, Madison.] L.S.

Neutral sulphite semichemical digestions of Aspen (*Populus tremuloides*) were made at Madison with Na_2SO_3 pulping liquors buffered with different agents to give spent-liquor pH values ranging from 7·2 to 8·9, and an unbuffered Na_2SO_3 liquor giving a spent-liquor pH value of 6·7. Results, given in graphs and tables, are as follows: (1) cooking time decreased with increased alkalinity; (2) strength of the pulps was little affected by the kind or degree of buffer, except for a slightly higher tearing strength when Na_2S or NaOH was used; (3) the brightest pulps were obtained when little or no buffering was added; (4) when fairly large amounts of $NaHCO_3$ were added a slightly higher pulp brightness was obtained by not relieving the excess digester pressure over that of the steam; and (5) the chemical composition of the pulp varied only slightly with buffering.

3026. RUNKEL, O. H. Über die Herstellung von Holzzellstoff unter Verwendung von Natrium-Chlorit. [**The preparation of wood**

pulp using sodium chlorite.] *Holzforschung, Berlin* 3 (2), 1949 (47–8). [G.] P.R.

Contains graphs omitted from the previous article. [*For. Abstr.* 10 (No. 450).]

3027. WACEK, A., and EISNER, G. Über die Aufnahme gebundenen Phenols durch Fichtenholz. [**The uptake of combined phenol by Spruce wood.**] *Repr.* from *Monatshefte für Chemie, Wien* 79, 1948 (564–9). 6 refs. [G.] [Das Chemische Laboratorium der Universität Wien, Organische Abteilung und Abteilung für Chemie des Holzes.] P.R.

Experiments to determine the amount of phenol combining with wood during the phenol pulping process are described, and the results, showing the effect of temperature, time and the quantity of catalyst present, are tabulated. An increase of temperature from 80 to 120° C. has a considerably greater influence than a further increase to 160°. The point of maximum reaction of phenol and wood is reached after 2 hr. The maximum reaction is obtained with an addition of 1·34 cc. acid catalyst; when increased amounts of catalyst are added, the quantity of combined phenol remains constant, but the ether-solubility of the phenol-lignin increases. The average quantity of phenol to combine with 1 g. wood is 0·22 g.

3028. SANDERMANN, W. Über die Umsetzung von Lignin und Holz mit Dicarbonsäureanhydriden. [**On the decomposition of lignin and wood with dicarboxylic acid anhydrides.**] *Svensk Papp Tidn.* 52 (15), 1949 (365–70). 23 refs. [G.e.sw.] P.R.

Lignin from Poplar and technical lignins were treated at 170° C. with a large excess of maleic or succinic anhydride; the Poplar lignin, but not the technical lignins, became soluble in water. Poplar wood, after treatment with maleic anhydride and saponification, gave an almost lignin-free pulp. This was not the case when succinic anhydride was used.

3029. VILARS, J. P. **Factors influencing properties of mechanical pulp.** *Technical Association Papers, Technical Association of the Pulp and Paper Industry, New York* 31, 1948 (420–2). [Research Laboratory, Papeteries Tarblay et Société Nouvelle de Papeterie, Paris.] P.A.T.R.A.

A method of evaluating the quality of groundwood pulp, based on screen fractionation and a modified tear test, is discussed. Tests can be converted to the same freeness basis for the comparison of different pulps. Factors affecting the pulp quality are: species; storage—the quality of wood, especially of hardwoods, is reduced by drying, and can be restored by soaking for a minimum of 48 hours; and grinding equipment. Tearing strength is the most important test for the control of mechanical pulps and papers containing large amounts of groundwood.

3030. ANDREWS, I. H. **Zinc hydrosulphite treatment of groundwood.** *Tappi* 32 (6), 1949 (286–8). L.S.

Values of brightness improvement are given for various treatment rates and temperatures of groundwood from Western Hemlock, Sitka Spruce and Balsam Fir.

3031. KINGSBURY, R. M., LEWIS, E. S., and SIMMONDS, F. A. **Observations on bleaching groundwood pulps.** *Technical Association Papers, Technical Association of the Pulp and Paper Industry, New York* 31, 1948 (185–9). 6 refs. [U.S. Forest Products Laboratory, Madison.] P.A.T.R.A.

Bleaching experiments on hardwood and softwood groundwood pulps, using sodium peroxide and hypochlorites, show that hardwood pulps are more easily bleached. They can be brought to the brightness range of 70–75; softwood pulps, with the exception of some Spruce pulps, generally fall in a lower range. Variations may be expected in response to bleaching in groundwood pulps from the same species. Brightness of hardwood pulps is generally better from bleaching with hypochlorites than with Na_2O_2, but the brightness of hypochlorite-bleached pulps is less stable. There seems to be an increase, which may be important, in tensile strengths, greater with hypochlorites than with Na_2O_2. [Cf. *For. Abstr.* 11 (Nos. 469–70).]

3032. ADAMS, D. O., and HUGHEY, G. B. **Hypochlorite bleaching of groundwood.** *U.S. Patent* No. 462,416, Jan. 10, 1950. *Abstr.* in *Paper Tr. J.* 130 (3), 1950 (36). P.R.

The method, which, it is claimed, bleaches groundwood rich in tannins and colour bodies to a brightness at least equal to that obtained in Spruce groundwood by hypochlorite bleaching, comprises first, extraction of the tannin and colour bodies soluble in dilute aqueous caustic alkali solution at temperatures below

boiling point, by treating the groundwood with a dilute solution of NaOH (about 10% based on the dry weight of the pulp), then washing the treated groundwood and finally treating it with hypochlorite ion in alkali solution in an amount not substantially above 15% available Cl, based on the dry groundwood.

3033. CRAIG, K. A. **Bleaching Poplar groundwood.** *U.S. Patent* No. 2,474,034, June 21, 1949. *Abstr.* in *Paper Tr. J.* 129 (21), 1949 (31). P.R.

Poplar groundwood containing rot fungi is treated with alkaline hypochlorite solution having a pH value of 9–11, and temperature of about 25° C., sufficient hypochlorite being present to provide about 7–15% available chlorine based on groundwood; after the consumption of the available chlorine the solution is acidified.

3034. APPLING, J. W., BUCKMAN, S. J., and MEALS, R. N. **A mold [found in groundwood pulp] with a high resistance to organomercurials: *Penicillium Roqueforti* Thom.** *Tappi* 32 (7), 1949 (300–2). 5 refs. L.S.

33.32.3. *Wallboards, Fibreboards, etc.*

See also *For. Abstr.* 11 (No. 2907).

3035. MÖRATH, E. Die Holzfaserplatte. **[Wood-fibre boards.]** *Holzforschung, Berlin* 4 (1), 1949 (14–25). 40 refs. [G.] P.R.

A survey of the historical development, manufacture and properties of the main types of fibreboard.

3036. CADY, E. L. **Compressed wood-fiber sheets useful as engineering materials.** *Materials & Methods, New York* 29 (2), 1949 (54–7). L.S.

Discusses and tabulates the properties of different types of Masonite hardboard, and describes their uses (especially for dies), working properties, and methods of manufacture.

3037. KOLLMANN, F., and DOSOUDIL, A. Holzfaserplatten: ihre Eigenschaften und Prüfung, mit besonderer Berücksichtigung der Dauerfestigkeit. **[Wood fibreboards: their properties and [methods of] testing, with particular reference to their fatigue resistance.]** *VDI-Forschungsheft, Düsseldorf* No. 426, 1949. pp. 32. 48 refs. [G.g.] P.R.

Results of strength tests on fibreboards are given in graphs and tables.

3038. VORREITER, L. Prüfung und Eigenschaften von Faserhartplatten. **[Testing and properties of fibreboards.]** *Mitt. öst. Ges. Holzforsch.* 1 (3), 1949 (13–25). [G.] P.R.

Recommends methods of testing and describing the properties of fibreboards, dealing with appearance, specific gravity and area weight, moisture or water content, swelling and shrinking, permeability and absorptive capacity. Gives the results, in graphs, of actual tests on 4 types of board.

3039. MARKWARDT, L. J. **Progress report on studies assigned to the representative of the U.S. Forest Products Laboratory [: shear parallel to the grain, impact bending and testing of fibreboards.]** [*Proceedings of the*] *First* [*F.A.O.*] *Conference on Mechanical Wood Technology, Geneva* 1949 (59–62 + 1 dgm.). [U.S. Forest Products Laboratory, Madison.]

3040. SAECHTLING, H. Einige neue Verfahren zur Erzeugung von Bauplatten aus geringwertigen Holzrohstoffen. **[Some new methods of making fibreboards from low-grade wood waste.]** *Holzforschung, Berlin* 3 (1), 1948 (24). [G.] P.R.

Contains graphs omitted from a previous article. [*For. Abstr.* 10 (No. 458).]

3041. VANCE, P. N. **Wood wastes used in the manufacture of Fir-Tex insulating board.** *For. Cl. Quart.* 23 (1), 1949–50 (19–21).

Short notes on the different sources from which the Fir-Tex Insulating Board Co. of St. Helens, Ore., obtains the bulk of its raw material.

3042. BOWERS, H. E. **New methods for treatment and use of wood waste.** *Paper Tr. J.* 130 (1), 1950 (29–31). P.R.

(1) A laboratory method of manufacturing boards from sawdust or shredded fibre of White Pine, using starch as a binder, gave good results; methods and equipment for commercial manufacture are described. The water resistance of the boards was poor, and a formaldehyde-vapour waterproofing treatment using an acid catalyst is described. (2) Porous structures of low apparent density have been made from wood fibre by using a finely

ground sublimable solid, such as naphthalene, as an extender; the density of these boards is comparable with that of cork, Balsa or lighter materials. (3) A very fine wood flour has been prepared by grinding fairly damp sawdust in a fluid-energy mill; fineness of the flour varied with the moisture content of the sawdust and the rate of feed. The colour is appreciably darker than that of flour made by grinding in hammer and attrition mills. This may be caused by the high temperature of the operation and by the iron/tannin reaction. (4) An electrostatic method of separating bark from sawdust is described; the wood particles appear to be less strongly attracted than bark particles to a charged surface, and satisfactory separations were obtained at a potential difference of 10,000 volts. Close sizing of the particles and a moisture content of about 7% appeared to be necessary. Fractions coarser than 8-mesh could not be separated at 10,000 volts, but might perhaps be separated at higher voltages. It was found difficult or impossible to separate particles finer than 25-mesh.

3043. NARAYANAMURTI, D., and BIST, B. S. **Studies in building boards. Part II. Preliminary studies on building boards from Bamboos.** *Indian For. Leafl.* No. 103, 1948. pp. 4 + 6 photos.

Culms of green *Bambusa arundinacea* and *Dendrocalamus strictus* were cut in strips, soaked in water, steamed, treated with phenolic resins, dried and woven into mats. The mats were pressed at 300° F. and a pressure of 500 lb./sq. in.—(1) without a filler; (2) with a filler of sawdust coated with resin; (3) with a filler of coconut coir pith. Results of strength tests on the boards are tabulated. The boards were of pleasant appearance and had satisfactory strength properties. Boards with any considerable quantity of pith as a filler proved hygroscopic and were coated with resin from Cashew nut shell oil; when the pith was leached with water it became less hygroscopic, and could be used without the resin.

3044. HOLDEN, A. S. **Drying of low density fiberboards in roller driers [: a description of methods and equipment].** *Tappi* 32 (6), 1949 (259–64). L.S.

3045. BEHR, E. A. **Preservation of fiber insulating board with chlorinated phenols.** *Technical Association Papers, Technical Association of the Pulp and Paper Industry, New York* 31, 1949 (388–93). 5 refs. P.A.T.R.A.

Field tests on the resistance to termites and decay of boards from groundwood and waste paper indicate that treatment of the pulp suspension with Na pentachlorophenate and precipitation with alum increases the life of the board 5–10 times over that of untreated controls; to give good protection, 0·75–1% pentachlorophenol, based on the dry weight of the board, should be used. When the Na pentachlorophenate is precipitated with $CuSO_4$, the treatment is twice as effective. Tetrachlorophenol gives rather less good results. All the board materials tested (including Southern Pine, Western softwood, Aspen and British groundwoods) were equally well protected by the treatment; none of the untreated materials was very resistant to decay, but of the untreated boards, that from Aspen proved best. Results are tabulated.

3046. CARLSSON, S. Transportproblem inom Wallboardindustrien. **[The problem of transport in the [Swedish] wallboard industry.]** *Svensk PappTidn.* 52 (21), 1949 (526–8). [Sw.] P.R.

Discusses the problem as it applies to (*a*) the raw material, (*b*) manufacture within the mill, (*c*) storing the boards, (*d*) distribution of the finished article.

3047. GELEFF, S. **Wood-wool concrete.** *Indian Concrete Journal, Bombay* 22 (12), 1948 (271–4). D.S.I.R.

Gives data on the properties (specific gravity, resistance to water, fungi, insects and fire, bending strength, and insulating capacity), and discusses the raw materials, manufacture and uses, of wood-wool concrete, made from wood wool, chemicals and a cementing agent.

33.32.4 *Plastics*

3048. SORGATO, H. Propriétés plastiques de la lignine. **[Plastic properties of lignin.]** *Chim. et Industr.* 6 (4), 1949 (345–8). 11 refs. [F.] D.S.I.R.

Discusses the manufacture and properties of lignin-base plastics, the thermosetting properties of lignin, and polymerization by formaldehyde and by furfural, and compares the properties of lignin and phenolic plastics.

3049. MEILER, J. G. (to Diamond Alkali Company, Cleveland, Ohio). **Manufacture of plastic products from wood (sulfur cook process).** *U.S. Patent* No. 2,490,078, Dec. 6, 1949. *Abstr.* in *Paper Tr. J.* 130 (2), 1950 (35). P.R.

(1) Lignocellulose is digested under pressure at a temperature between 150 and 250° C. with a mixture of black liquor, the amount of the mixture and the length of the digestion being such as to produce a final pH of 7·5–9·5. (2) A woody material is digested under pressure, and at a temperature of beween 150 and 285°C., in an alkaline solution and in the presence of 1–20% of elemental sulphur based on the alkaline solution, to obtain a final pH of between 4·5 and 9·5.

33.33. Manufacture of Textiles and Cellulose Derivatives from Wood

See also *For. Abstr.* 11 (No. 2997).

3050. WULTSCH, F. **Manganese in pulp and its influence on the ageing process in the manufacture of viscose.** *Papierfabrikant, Berlin* 1944 (345–6). *Chem. Abstr.* 43 (1), 1949 (396–7). P.R.

Mn found in pulp could be traced back to the original wood and more specifically to the wood rays, which give rise to the 'fine stuff'. When the rays were removed the Mn content dropped markedly, especially when the fine stuff was separated from unbleached stock. The so-called fine stuff in bleached pulps is due largely to broken tracheids and contains only traces of Mn. Experiments with a pulp with a degree of polymerization (d.p.) of 972 aged at 25° C. showed that Mn acted as a catalyst in reducing the d.p. during the ageing process and that 0·1 mg. Mn/100 g. pulp (or less) had very little effect. Only when the Mn content rose to 0·28 mg./100 g. were the catalytic effects noteworthy.

3051. MARTIN, M. E., and UMANSKY, M. (to Celanese Corp. of America). **Cellulose purification.** *U.S. Patent* No. 2,482,858, Sept. 27, 1949. *Chem. Abstr.* 44 (1), 1950 (328). P.R.

Unbleached sulphite wood pulp was treated with 0·5% NaOH solution for 15 minutes at 135° C., washed neutral, chlorinated with 1·5% available Cl for 30 minutes, neutralized with Na_2SO_3, washed with 0·25% NaOH solution at 50°, washed neutral, and digested again for 15 minutes at 135° in 0·75% NaOH solution, washed neutral, bleached twice with NaOCl solution and washed neutral. Yield, 75–80% of a lignin-free pulp with 93% α-cellulose and 1·5% pentosans. This, and other pulp products similarly obtained are particularly suitable for esterification and etherification.

3052. HEUSER, E., SHOCKLEY, W., and AKKER, J. A. VAN DEN. **Determination of the suitability of wood pulp for acetylation.** *Tappi* 32 (6), 1949 (251–3). 7 refs. [Institute of Paper Chemistry, Appleton, Wis.] L.S.

3053. JAYME, G., and WELLM, J. **Conversion of cellulosic material into viscose by the emulsion method for the determina- of the viscosity and the mean degree of polymerization. 1. Development of a new measuring technique. 2. Application of the measurements to celluloses of high viscosity and unbleached pulps.** *Transl. For. Prod. Aust.* [1949]. pp. 37 + 25 + 1 dgm., 10 gphs. 38 refs. Transl. by G. Schwerin from *Kolloid-Zschr.* 107 (3), 1944 (163–80); 108 (1), 1944 (20–30). P.R.

33.34. Dyeing and Bleaching of Wood

3054. **How various species of hardwoods are bleached for blonde, pickled and modern finishes.** *National Hardwood Magazine, Memphis* 23 (5), 1949 (42–6, 65). P.R.

Discusses the hardwood species that are easy and hard to bleach, and the bleaches used commercially, giving instructions for their use.

3055. BOLIDENS GRUVAKTIEBOLAG. Procédé de coloration du bois, des produits en fibres de bois, ainsi que d'autres matières organiques, en liaison avec leur préservation; solution servant à cet effet. [**Method of colouring wood, wood-fibre products and other organic materials, during preservation; solution effecting this.**] *Swed. Patent* No. 121,640, May 11, 1948. *Abstr.* in *Chim. et Industr.* 61 (6), 1949 (587). [F.] D.S.I.R.

The material is treated with a solution containing the necessary preservatives and sufficient permanganate, up to a quantity of 1 g./litre, to colour the material.

33.36. Wood Finishes. Preservation of Wood. Seasoning and Drying

3056. **Painting of timber.** *Rep. N.Z. For. Serv. 1948–9,* 1949 (37).

Inspections of houses in course of erection have drawn attention to the undesirable practice of allowing the priming coat on weatherboards to weather for 6–12 months before an undercoat is applied. *Pinus radiata* will not stand this neglect. When the priming coat no longer provides protection to the timber, the boards cup and also check very badly. The cupping opens up gaps at the laps, and the checks cannot be adequately covered by subsequent painting. Hence for *P. radiata* the need for correct painting practice is even more essential than with heartwood of indigenous species. The additional protection afforded by back-priming the weatherboards, provided that they are at the correct moisture content (15–18%) when primed, is recommended. The undercoat and finishing coat should be applied not later than 4 weeks after priming.

3057. **Interim specification for aluminium pigmented wood-primer.** *Inter. Specif. Stand. Ass. Aust.* No. SAA Int. 57, 1949. pp. 11. Price 2*s*. P.R.

33.36.1. *Preservation against Attack by Plants and Animals*

See also *For. Abstr.* 11 (Nos. 2796–9, 2808–12, 2847–54, 2951, 3045, 3055).

3058. HINDSON, W. R., and MORTENSEN, K. N. **Fungicidal treatment of textile, leather and other materials [including paper, timber, adhesives and plastics.]** *Circular, Defence Research Laboratories, Department of Supply and Development, Australia* No. 12, 1948. pp. 52. 72 refs. P.R.

3059. SANDERMANN, W. Neue amerikanische Verfahren zur Schutzimprägnierung von Holz. [**New American methods of wood preservation.**] *Weltholzw.* 1 (13), 1949 (208–10). 12 refs. [G.] [Zentralanstalt für Forst- und Holzwirtschaft, Reinbek bei Hamburg.] P.R.

Describes the T.C. vapour-drying process of the Taylor-Colquitt Co., Spartanburg [cf. *For. Abstr.* 9 (Nos. 1758–63); 11 (No. 3094)], and the Dri-Vac process of the Protection Products Manufacturing Co., Kalamazoo, Michigan. [Cf. *For. Abstr.* 10 (No. 1269).]

3060. EDWARDS, W. A. **The practical evaluation of wood preservatives.** *Paint Technol.* 24 (164), 1949 (351–3). P.R.

Describes briefly the methods of graveyard test and Petri-dish laboratory test, and, in detail, the wood-block laboratory test, which is recommended as preferable to either of the other methods.

3061. SEDZIAK, H. P. **Accelerated testing of wood preservatives including wood block soil technique.** *Mimeo. For. Prod. Lab., Can.* No. 0–149, 1949. pp. 8. P.R.

Tests on wood preservatives have been satisfactorily carried out at the Forest Products Laboratory by 2 methods. In the first, pickets $\frac{3}{4}$ in. × $\frac{3}{4}$ in. are treated and placed in an outdoor test plot; in the second, $\frac{3}{4}$-in. cubes of wood treated with the preservative are successively subjected to weathering tests, placed in jars of soil, inoculated with a standard culture, and subjected to conditions favourable to decay. A number of pickets, from fully seasoned sapwood of Red Pine, are treated and used for simultaneous field and laboratory tests and the results are correlated. The laboratory wood-block method is described in detail.

3062. GIESEKING, E. Entwurf eines Holzschutzerlasses. [**Draft for wood-preservation regulations.**] *OHV-Mitteilung, Arbeitskreis Osmose-Holzschutz-Verwertung für Werk- und Bauholz, Berlin-Zehlendorf* No. 487, [*n.d.*] pp. 5. [G.] P.R.

3063. BROWNE, F. L. **Water-repellent preservatives for wood [: their nature, application and properties].** *Repr.* from *Architectural Record, New York* March, 1949 (131–2, 174). [U.S. Forest Products Laboratory, Madison.] P.R.

3064. SCHULZE, B., and BECKER, G. Untersuchungen über die pilzwidrige und insektentötende Wirkung von Fraktionen und Einzelstoffen des Steinkohlenteeröls. [**Research on the fungicidal and insecticidal effect of fractions and individual substances of coal tar.**] *Holzforschung, Berlin* 2 (4), 1948 (97–127). 47 refs. [G.g.] P.R.

Results of experiments on the effect of 37 fractions and single substances on wood-destroying fungi (*Coniophora cerebella, Poria*

vaporaria, *Lentinus lepideus* and *Lenzites abietina*) and insects (larvae of *Anobium punctatum* and *Hylotrupes bajulus*, and *Calotermes flavicollis*) are given in graphs and tables; also lists of the substances that are most effective against the different fungi and insects.

3065. KOPWILLEM, J. **Höganäs coal-tar oil as a wood preservative.** *IVA, Stockholm* 20 (2), 1949 (50–60). 6 refs. [E.e.] [Höganäs-Billesholms AB Central Laboratory, Sweden.] L.S.

Wood-block and agar tests of Högänas coal-tar oil, a distillate of the tar recovered as a by-product in the production of gas, and of Habinol, a wood preservative obtained by chlorinating the oil, show that both products are toxic to common wood-destroying fungi. They are also resistant to leaching and to evaporation. Results are tabulated.

3066. MANOL, A.-G. **Wood preservatives.** *Swiss Patent* No. 257,725, Apr. 1, 1949. *Chem. Abstr.* 44 (2), 1950 (791–2). P.R.

Tall oil 40 kg. and spindle oil are mixed and warmed with rosin 5 kg. in ethylene dichloride 10 kg. Mineral oil 10 kg. containing Zn naphthenate is then added with an oil-soluble dye. The product is a thin oily solution which may be applied by brushing, spraying or dipping, to wood which is as dry as possible. Protection against fungi is claimed. The addition of 15% by weight of an insecticide, such as DDT or hexachlorocyclohexane, gives protection against pests, especially insects, larvae, termites, woodworms, etc.

3067. ALLIOT, H. La protection des bois. **[The protection of wood.]** *Rev. int. Bois* 16 (149), 1949 (200–1). [F.]

Recommends the use of various phenol products manufactured by the Société 'Progil', 10 Quai de Serin, Lyon 5e:—Cryptogil EA6, which is used for spraying Beech logs and has also given good results in Africa; Cryptogil Na used as a dip for tropical timbers against stain fungi; Cryptogil SOR, specially designed for the treatment of wood for joinery, which has drying, as well as fungicidal and insecticidal properties.

3068. SAVORY, J. G. Rapport sur les essais de laboratoire sur la toxicité du Cryptogil S.G.R. pour les champignons. **[Report on laboratory tests on the toxicity of Cryptogil S.G.R. to fungi.]** *Rev. Bois Appl.* 4 (12), 1949 (42–3). [F.] [Forest Products Research Laboratory, Princes Risborough.]

Tests were carried out at Princes Risborough on sample blocks of Scots Pine and Beech treated with Cryptogil at different concentrations, by different methods of application. The Pine blocks were exposed to attack by *Lentinus lepideus*, *Coniophora cerebella*, and *Poria vaporaria*, and the Beech to *Polystictus versicolor*. The results, which are tabulated, show that Cryptogil is very toxic to all the fungi tested. Pine and Beech impregnated under pressure with a 10% solution (corresponding to a retention of 25 kg./cu.m. or 1·6 lb./cu. ft.), and Pine soaked for 10 seconds and Beech for 10 minutes in undiluted Cryptogil, were all free from attack after 3 months.

3069. **Specification for fluor-chrome-arsenate-phenol type of timber preservative.** Standards Council, Pretoria. No. *S.A.B.S.* 37, 1949. pp. 13 + 13. [E.Afrik.] [South African Bureau of Standards, Pretoria.] Price 5*s*. P.R.

3070. **Specification for metallic naphthenates for timber preservation.** Standards Council, Pretoria. No. *S.A.B.S.* 38, 1949. pp. 14 + 14. [E. Afrik.] [South African Bureau of Standards, Pretoria.] Price 5*s*. P.R.

3071. **Specification for zinc chloride for timber preservation.** Standards Council, Pretoria. No. *S.A.B.S.* 39, 1949. pp. 10 + 10. [E. Afrik.] [South African Bureau of Standards, Pretoria.] Price 5*s*. P.R.

3072. **Specification for zinc meta-arsenite for timber preservation.** Standards Council, Pretoria. No. *S.A.B.S.* 41, 1949. pp. 10 + 10. [E. Afrik.] [South African Bureau of Standards, Pretoria.] Price 5*s*. P.R.

3073. **Specifications for pentachlorophenol for timber preservation.** Standards Council, Pretoria. No. *S.A.B.S.* 42, 1949. pp. 12 + 12. [South African Bureau of Standards, Pretoria.] Price 5*s*. P.R.

3074. **Specification for acid-cupric-chromate for timber preservation.** Standards Council, Pretoria. No. *S.A.B.S.* 43,

1949. pp. 10 + 10. [E. Afrik.] [South African Bureau of Standards, Pretoria.] Price 5*s*. P.R.

3075. SCHULZE, B. Neue Schutz- und Bekämpfungsmittel gegen holzzerstörende Insekten und Pilze. II. Grundlage: Hydrogenfluoride. **[New preservatives against wood-destroying insects and fungi. II. Those with a basis of hydrogen fluoride.]** *Holzforschung, Berlin* 3 (2; 4), 1949 (32–47; 97–117). 46 refs. [G.] P.R.

Results of experiments on the different properties of 5 wood preservatives are tabulated. FIP 18, an alkali hydrogen fluoride and primarily a fire-proofing agent, has good preservative effect against wood-destroying insects and fungi and a protective effect on iron against corrosion. The raw materials needed for its manufacture are not at present available. IPF 90 (KF.HF), IP 46 (NH_4FHF) and IP 82 (NH_4FHF with alkali monofluoride) are good preservatives against wood-destroying insects as stomach and contact poisons and against fungi and moulds. Their power of penetration is good, and they are reasonably resistant to evaporation but not to leaching. IPF 90 and IP 46 both corrode iron too much for use in practice; IP 82 corrodes iron only slightly, but reduces wood strength. Osmol WB_4, an alkali hydrogen fluoride with organic substances added, has insecticidal and fungicidal properties equal or superior to those of IPF 90, IP 46 and IP 82 and closely related fire-proofing qualities, good penetration, no corrosive effect on iron and no harmful effect on wood strength. Methods of application and safety precautions in handling are discussed.

3076. SANDSTRÖM, S. Imprégnation et conservation du bois par le sel préservateur de Boliden. **[Impregnation and preservation of wood by means of Boliden preservative salts.]** *Rev. int. Bois* 16 (149), 1949 (203–8). [F.]

Gives an account of the composition of Boliden salts and the method of pressure treatment now generally used. Data are given on results of comparative tests of Boliden salts, carried out at Stockholm, at Barro Colorado, Canal Zone, U.S.A., at Elandskuil, S. Africa, and on the west coast of Sweden. There are at present 36 pressure and 10 non-pressure plants in Sweden, using these salts, which are manufactured by the Bolidens Gruvaktiebolag, Stockholm, for the treatment of telegraph and telephone poles, railway sleepers, mine timbers etc.

3077. VERRALL, A. F. **Some moulds on wood favoured by certain toxicants.** *J. agric. Sci.* 78 (12), 1948 (695–703). 12 refs. O.R.E.

Fields tests showed that treatment of green Pine sapwood with some fungicides favoured heavy development of certain moulds. Borax favoured the development of *Alternaria*, silicofluorides and tartar emetic *Trichoderma viride*, and organic mercurials *Penicillium cyclopium*. Urea favoured both *Trichoderma* and *Penicillium*. The extent and luxuriance of *P. cyclopium* on wood treated with ethyl mercuric phosphate increased as the concentration of the solution was increased up to that used commercially for stain control. Laboratory tests with *T. viride* on fluoride-treated and *P. cyclopium* on mercurial-treated wood indicated that their luxuriant growth was partly due to elimination of competing organisms by the fungicides. Heat sterilization of otherwise untreated wood increased mould growth as much as the fungicides. Tests also showed that these moulds are highly tolerant to the respective fungicides. In the case of *P. cyclopium* very low concentrations of the mercurial actually favoured its development, even in pure culture. *From author's summary.* [Cf. *For. Abstr.* 8 (No. 1850).]

3078. ZABEL, R. A., and FOSTER, C. H. **Effectiveness of stain control compounds on White Pine seasoned in New York.** *Tech. Publ. N.Y. St. Coll. For.* No. 71, 1949. pp. 17. 6 refs.

Tests were made on 1,000 samples, and sawmill studies on 20,000 bd. ft., of freshly sawn White Pine lumber, of several compounds for the prevention of sap stain. They are rated in decreasing order of effectiveness as follows:—a mixture of ethyl mercury phosphate and Na pentachlorophenate; a mixture of Na pentachlorophenate and borax; Na pentachlorophenate; a mixture of tetrachlorophenate and 2-chloro-orthophenylphenate; Na pentachlorophenate, borax and Na_2CO_3; Na tetrachlorophenate, ethyl mercury phosphate; and quaternary ammonium naphthenate.

3079. BECKER, G. **Destruction of wooden masts by beetle larvae.** *Elektrotechnik* 2, 1948 (248–50). *Brit. Abstr.* BI, May, 1949 (413). P.R.

A general review of the destruction of telegraph poles by fungi and larvae. A detailed description is given of the wood-destroying insects (*Hylotrupes bajulus* and *Ergates faber*) and how their presence may be detected. The protection of the poles, usually made from coniferous woods, against these pests, by chemical or other means, is discussed.

3080. SPILLER, D. **Toxicity of some metallic sulphates to the common house borer, *Anobium punctatum* De Geer.** *N.Z. J. Sci. Technol.* 30*B* (1), 1948 (20–1). P.R.

A method has been developed for testing the toxicity of preservatives by using large numbers of eggs on small treated blocks of susceptible wood. After 9 months under conditions of temperature and humidity favouring the development of *Anobium* larvae, blocks are examined for their presence. Judged by this test the sulphates of Na, Al, Fe, Mg and Mn are insufficiently toxic to be considered as potential wood preservatives. Results are tabulated.

3081. SPILLER, D. **Toxicity of boric acid to the common house borer *Anobium punctatum* De Geer.** *N.Z. J. Sci. Technol.* 30*B* (1), 1984 (22–3). 3 refs. P.R.

Tests have shown that borid acid in quantities equal to 0·043% of the dry weight of the treated wood prevents larval development. At 0·022% and below, larvae can survive.

3082. ELLIS, C. **An analysis of the cost of immunisation treatment for *Lyctus*.** *Aust. Timb. J.* 15 (10), 1949 (710, 713, 715, 717).

Three types of operation are analysed in detail: (1) hot-and-cold-bath (open vat, steam heated with a closed coil), (2) steam-and-cold-quench (closed vat in which the charge is steamed for 2–4 hrs., and the chamber is then flooded with solution at atmospheric temperature), and (3) hot-and-cold-bath (open vat, heated by an external directly fired copper coil). The costs are based on the assumption that the installation is of reinforced concrete, unlined, and that an 0·2% concentration (expressed as boric acid) is obtained in the core of boards 1 in. thick.

3083. HOCKENYOS, G. L. **Proposed N.P.C.A. approved reference procedures for subterranean termite control.** *Pest Control* 17 (10), 1949 (28–31, 34). D.S.I.R.

Discusses structural details of buildings, soil treatment, foundation treatment and wood treatment for termite control.

3084. PETER, M. **Tools for injecting protective materials into wood.** *Brit. Patent* No. 614,579, July 13, 1946. *Brit. Abstr.* BI Oct., 1949 (836). P.R.

Injection heads for injecting liquids into telegraph poles, trees etc. comprise a needle surrounded by an annular piston with its front end behind the point of the needle.

3085. **[Service tests of creosoted Rimu and Larch poles.]** *Rep. N.Z. For. Serv. 1948–9*, 1949 (36).

Service test lines of creosoted Rimu [*Dacrydium cupressinum*] telegraph poles were examined. Whereas untreated controls had failed after 2–4 years' service, all but 2 of the treated poles were found to be perfectly sound after 18 years' service. The poles were treated by the open-tank process, and their present state indicates that an average life of more than 30 years may be expected for poles thus treated.

The performance of creosoted Larch [*Larix decidua*] poles, which are much used for the rural telegraph and telephone network, is being studied. Larch poles are known to check severely during seasoning before preservative treatment, and it was feared that these checks might progress during the service life of the poles and extend beyond the depth of creosote penetration. Poles examined after 10 years' service, however, showed no evidence of decay, and it would appear that no extensive exposure of untreated wood occurs after the creosoting.

3086. CORTES, R. T., and CAPILI, E. T. **'Hot and cold bath' treatment of Ipil-ipil posts.** *Philipp. J. For.* 6 (1), 1949 (23–37 + 2 photos). 12 refs.

Posts of *Leucaena glauca* were treated with a 50 : 50 mixture of creosote and water-gas tar preservative by the hot-and-cold bath process. Only the sapwood was penetrated. Average penetration was 0·71 in., which was also the average thickness of the sapwood of the 32 posts tested. There was no penetration of heartwood even at the ends. The average

absorption for the 32 posts was 7·2 lb./cu. ft. or 5·16 lb./post. Posts that were boiled before removal of the bark had better absorption than those barked without boiling. Figures of costs for different forms of treatment are given.

3087. **[Demonstration of preservative treatment of fence posts.]** *Rep. Tenn. Vall. Auth.* 1949 (16–7).

The TVA has designed mobile timber-treating equipment for demonstrating both the cold-soaking and the hot-and-cold-bath processes. Two trailer-mounted tanks, equipped with an overhead hoist, are pulled by a lorry which carries 650 gal. of treating solution, a power pump for transferring the solution to and from the treating tanks, and heating torches for use when the hot-and-cold-bath method is demonstrated.

3088. WALTERS, C. S., and KULP, D. A. **Report on Project 301–C. Preservative treatment of fence posts with toxic oil solutions by cold-soaking, dipping and brushing.** *For. Note Ill. agric. Exp. Sta.* No. 12, 1950. p. 1 + 1 tbl.

3089. DIXON, R. D., and MURPHY, M. M. **Fence post preservation by the cold-soak method.** *Circ. Ga. Exp. Sta.* No. 161, 1949. pp. 8. P.R.

Posts should be cut from weed trees during autumn and winter, barked and stacked; after 3–5 months of drying they will be ready for treatment. The size of the treating tank will depend on the size of the material, and the treating time (24–48 hr.) on the season. A retention of 6 lb. of preservative per cu. ft. will generally give adequate protection. Costs of treating posts of different diameters with 5% pentachlorophenol and 5% Cu naphthenate are tabulated.

3090. RAPHAEL, H. J. **The influence of depth of immersion on end penetration in Douglas-Fir heartwood when cold-soaked in pentachlorophenol.** *Abstr.* of thesis, in *J. For.* 48 (1), 1950 (49).

Increasing the depth of immersion up to 10 ft. seems justified. Depths greater than 10 ft. appear to result in only a slight increase in average end penetration.

33.36.2. *Fireproofing*

3091. HARDER, R. W. **Fire retardant lumber—a neglected building material.** *Engng. News-Rec.* 142 (7), 1949 (76–8). D.S.I.R.

Examples of the use of fire-retardant timber by the U.S. Navy and by railway companies are described and further uses enumerated. The following recommendations are made:—(1) As certain species are structurally damaged by some chemicals, species and treatments which have proved satisfactory in tests should be specified. (2) As the strength of all species is reduced by high retention of salts, timbers subjected to high stresses should either be treated with low retentions or faced with fire-retardant protective sheeting. (3) Moisture content of the timber should be reduced to a minimum, to avoid the excessive shrinkage which follows salt treatment. Titles of specifications covering test procedures and requirements on concentration, retention and penetration published by the U.S. Navy, the American Society for Testing Materials, the Forest Products Laboratory, and the Underwriters' Laboratories, are listed.

3092. **Fire retardant paint resists 2000° flame.** *Fire Prot., Lond.* 13 (112), 1950 (70). P.R.

'Flame-seal' a fire-retardant paint manufactured by the Stallton Chemical Corporation, Long Island City, New York, has been applied to Douglas Fir, Idaho, Ponderosa and Yellow Pine, and submitted to tests. Unpainted timber protected with a coating of this paint can withstand a 2,000° F. blowlamp for 30 minutes without any flame spread, the paint forming a white crust which creates a hard protective wall at least 8 times as thick as the original coating. Exposure to the blow-lamp flame on one spot for more than 30 minutes results in some charring but no combustion. The paint is claimed to be both moisture and termite proof, and to be non-toxic both in application and when attacked by fire.

3093. MANN, R. H. **Fireproofed wood door withstands fire test for 90 minutes.** *Sth. Lumberm.* 178 (2235), 1949 (101–2).

Gives details of a fire-proofed flush door manufactured by Fox Bros. Manufacturing Co. of St. Louis, Mo. The door is 2¼ in. thick, having a core, stiles, rails and panels of Ponderosa Pine, two ⅛-in. layers of Poplar cross-bonding and two ⅛-in. face veneers of Walnut. All parts of the door, except the face

veneers were pressure treated with fire-retardant salts. The door not only passed the 1½-hour standard ASTM–ASA fire test, but prevented the passage of fire and smoke round the edges. The transmitted heat was also strikingly low.

33.36.3. *Seasoning. Drying*

See also *For. Abstr.* 11 (Nos. 2872, 2942–3, 3067).

3094. GOTTSTEIN, J. W. **Vapour drying.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 177, 1949 (1–2).

Discusses the principles of vapour drying and describes experimental equipment in use at the Division of Forest Products to test the value of the process for Australian species. [Cf. *For. Abstr.* 11 (No. 3059).]

3095. PANSHIN, A. J. **Lumber dry kilns and their operation.** *Spec. Bull. Mich. agric. Exp. Sta.* No. 359, 1949. pp. 70. 4 refs. I.F.B.

Includes sections on: methods of determining wood moisture content; factors (heat, humidity, ventilation and circulations) affecting the drying of wood; types of kilns and their construction; kiln operation; kiln defects; kiln records; and care of kiln-dried wood; with an appendix listing American dry-kiln designers and manufacturers of equipment.

3096. TOWERS, W. K. **Dry kiln designed for lift-truck operation.** *Wood-Worker, Indianap.* 68 (1), 1949 (54, 56–7). P.R.

The use of a lift truck to carry timber to the kiln calls for side loading of the kiln in place of the normal end loading. Special kiln trucks and tracks for them to run on are eliminated.

3097. **A pre-fabricated kiln.** *Timb. Tr. J.* 191 (3822), 1949 (1694).

The kiln was designed by Bachrich Patents Ltd. of London. It consists of steel framed sections, aluminium-lined on the inside and steel-clad on the outside, the space between the panels being fitted with insulating material, giving the unit a thermal insulation value equal to that of a 9-in. brick wall. The drying mechanism incorporates modern internal fanning with cross-shaft cross-ventilating fans. The kiln can be heated by steam from outside sources, or from its own independent furnace. It will stand on the usual concrete factory floor, and requires no foundations.

3098. **Experimental electric dry kiln.** *Rep. Tenn. Vall. Auth. 1949* (14).

An experimental electric kiln for drying lumber is now in operation by the TVA. It is of the forced-air-circulation type with a gross capacity of 3,500 bd. ft., and can be operated with steam or electricity or with both at once. Total cost of materials plus electrical work done on contract, was about $4,000. Eight months of operation shows that well conditioned lumber can be produced at electricity costs of $3–12/1,000 bd. ft. Total drying costs range from $20.00 to $30.00 per 1,000, depending on the species, thickness, and initial moisture content of the wood. Although these costs are considerably higher than those for large steam kilns, results so far obtained indicate that the small electric dry kiln may have a definite place in the woodworking industry.

3099. JOLLY, W. W., and STANFIELD, J. H. **An experimental electric kiln for drying lumber.** *Sth. Lumberm.* 178 (2235), 1949 (88, 90, 92).

Some information on design, cost of construction, and cost of running a small electric drying kiln, based on tests made at Stair Technical High School, Knoxville, Tenn.

3100. DUNCAN, G. **Dry kiln instrumentation and control.** *Timber of Canada* 10 (4), 1949 (33–6).

3101. SMITH, H. H. **Seasoning California Black Oak [*Quercus kelloggii*].** *For. Res. Notes Calif. For. Range Exp. Sta.* No. 62, 1949. pp. 8. 6 refs.

A successful trial with ¾-in. stock, by both air and kiln drying, with practical recommendations.

3102. **[Seasoning of *Beilschmiedia tawa.*]** *Rep. N.Z. For. Serv. 1948–9*, 1949 (35–6).

A small-scale study was made of accelerated drying of Tawa [*Beilschmiedia tawa*] blocks for subsequent turning into shoe-lasts. Even with the use of chemicals to minimize checking during seasoning, it is obvious that kiln drying down to the final required moisture content of 12–15% is not the best method. It is preferable to kiln dry the quartered logs to about 30%

moisture content; they should then be rough-turned and stored for slow final seasoning in a conditioned room.

3103. **Proper veneer seasoning.** *Veneers & Plyw.* 43 (10), 1949 (12–3). P.R.

Cracking along the grain at the ends of face veneers during pressing in cold weather is probably due to the decrease of humidity in the air and the veneer. An analysis showed rapid moisture loss along the end grain, causing slight shrinkage at the ends of the veneers; the difference in widths pulled the sheet into a concave shape, and when pressure was applied during pressing, the grain parted at the edges. This can be prevented by maintaining an air humidity of 50–60% in the veneer storage room during the winter months; when urea glues are used, the moisture content of veneers should be maintained at a level of 7–8%, and even higher for some species.

33.37-8. Destructive Distillation. Charcoal and By-products. Use of Wood and Charcoal for Gas Manufacture

See also *For. Abstr.* 11 (Nos. 2828, 2861–3, 2870).

3104. JENSEN, W. **A study of the thermal processes in the pyrolysis of Birch wood.** *Pap. ja Puu* 32*B* (1), 1950 (3–9). 6 refs. [E.] [Institute of Wood Chemistry, Åbo Akademi, Åbo.] P.R.

Temperature readings obtained early in the carbonization process cannot be regarded as accurate because of the variation in temperature between different parts of the material. When reactions have set in throughout the material, however, the readings become more reliable and indicate that the reaction maximum lies within the range 275–425° C. Calculations of the thermal process prove that as a result of exothermic reactions Birch wood liberates on carbonization a quantity of heat amounting to about 300 kcal./kg. absolutely dry wood. Results are given in graphs and tables.

3105. KASSAY, L. Falepárlás az erdögazdaságban. **[Distillation of wood in [Hungarian] forest economy.]** *Erdész. Lap.* 85 (2), 1949 (32–5). [Hu.e.f.g.]

Describes, with photos and diagrams, the details and working of a small experimental distillery set up by the author at Nova. He points out that the value of the various distillation products amounts to 6–10 times that of the fuel consumed and estimates that Hungary would save over 25½ million florins p.a. by importing fuel for distillation, instead of charcoal (40,000 metric tons) and other distillation products (2,000 metric tons).

3106. BERKEL, A., and HUS, S. Meşe, gürgen, kestane, kayin ve kocayemiş, odunlarindan torluklarda kömür imaline ait denemeler. **[Experiments in charcoal manufacture from Oak, Hornbeam, Chestnut, Beech and Arbutus.]** *Ankara Yüksek Ziraat Enstitüsü Dergisi* 7 (1) (Ser. No. 13), 1946 (38–58). 6 refs. [Turk.]

Charcoal is one of the commonest fuels in Turkey. The poorer inhabitants use it for warming their houses and cooking, and it is also used in certain industries. That consumption is increasing is shown by the fact that in the 7 [?] years from 1937 annual consumption averaged 805,428 quintals as compared with 410,200 in 1935. As a rule, 97% of the charcoal comes from deciduous trees. The best charcoal is that from Oak, Beech, Hornbeam, Ash or Elm. Of the conifers, Pine is the most used.

The present investigation is the first of a series which will be carried out in future years on Turkish charcoals. Oak, Beech, Hornbeam, Chestnut and Arbutus were obtained from the 'Belgrad' forest, which supplies a large part of Istanbul's charcoal and extends inland 30–50 km. from the shores of northern Thrace. In 1937 it provided 1 million quintals of wood, equivalent to 40–60 thousand quintals of charcoal.

The cut billets, 1 m. long and 0·02–0·16 m. thick, were left 20 days in the forest, then brought to the kiln sites, where they were carefully stacked and left for another 15–20 days to dry. The kilns were of the old-fashioned conical type, the billets being stacked obliquely against a central 5–6 ft. post, to form a kiln 13·6 m. in basal circumference and 1·60 m. high, and covered with leafy Oak branches, Oak leaves and forest soil mixed with charcoal dust, which was watered and tamped. Kilning times were:—Oak, 107 hr. for 9·8 steres; Hornbeam, 95 hr. for 6·87 steres; Chestnut, 72 hr. for 7·76 steres; Beech, 97 hr. for 10·0 steres; Arbutus, 76 hr. for 7·5 steres. Although

cut in April and May and left 1–2 months to dry, the wood had not attained the correct dryness (taken as 20% moisture) when kilned.

Data obtained include the following:—(1) Yields by weight and volume: Oak 19·29 and 43·89%, Hornbeam 20·64 and 46·14%, Chestnut 17·41 and 48·19%, Beech 17·20 and 40·81%, Arbutus 26·60 and 46·53%. (2) Moisture content: charcoal of all five species left *ca.* 4 months during the summer in a comparatively dry room, 3·5 to 4·85% on dry weight; Oak charcoal, kept during the winter in a damp storeroom, 7·5%. (3) Specific gravities of air-dry and completely dry charcoal: Oak 0·525 and 0·485, Hornbeam 0·431 and 0·411, Chestnut 0·333 and 0·33, Beech 0·512 and 0·436, Arbutus 0·523 and 0·843. (4) Shrinkage from wood to charcoal: *ca.* ⅛ diam., ⅛ length. (5) Calorific value: Oak 7408, Hornbeam 7908, Chestnut 8221, Beech 7537, Arbutus 7955. (6) Ash content: Oak 3·2%, Hornbeam 2·7%, Chestnut 0·55%, Beech 3·2%, Arbutus 1·5%.

3107. BALDWIN, H. I. **Yields and costs of charcoal making.** *Fox For. Notes N.H. For. Dep.* No. 43, 1949. pp. 1.

Report on the use of portable steel drum charcoal kilns at Black Rock Forest.

3108. RICHARDSON, N. A., and SMITH, D. N. **Production of charcoal.** *Brit. Pat.* No. 631,439, Nov. 2, 1949. pp. 3. [Forest Products Research Laboratory, Princes Risborough, Aylesbury, Bucks.] Price 2*s.* P.R.

The process described produces charcoal in relatively non-fragile slabs or blocks. The wood, in slab or block form, has all the moisture removed and its dry distillation is effected in an inert atmosphere, using an accurately controlled temperature schedule, so that the temperature of the wood is gradually raised to between 700 and 900° C. over a period of 36–48 hours. The charcoal is allowed to cool slowly in the inert atmosphere to near atmospheric temperature before it is removed from the furnace. The process is preferably applied to woods of uniform texture, e.g. Lime, Maple, Willow or *Podocarpus* species.

3109. NAJASAPOETRA, M. S., and GRIFFIOEN, K. Houtverkoling volgens de Japanse methode 'Ishikawa'. **[Charcoal burning by the Japanese 'Ishikawa' method.]** *Rapp. Bosbouwproefsta. Buitenzorg* No. 25, 1949. pp. 12 + 20 dgms. [Du.du.]

The construction of a kiln of the Ishikawa type built experimentally at Buitenzorg station is described, with dimensions and illustrations. The walls and dome-shaped roof are of equal parts of clay and cement. The process is carried out by direct contact of the charge with burning wood. Charges of unsorted decayed *Hevea* were burnt at temperatures of 765, 840 and 900° C.; in spite of its poor quality, the charge yielded good charcoal. Figures for the specific gravity, hardness and absorption of the charcoal obtained are tabulated.

3110. BERTHELOT, C. **Simultaneous production of gasifier wood and wood charcoal.** *Carburants nat.* 5, 1944 (101–4). *Chem. Abstr.* 40, 1946 (7573). O.R.S.

By thermotechnical combination of a wood-drying process with carbonization of wood it is possible to produce simultaneously, in the same plant, wood charcoal and a high-quality, dry gasifier wood for use in automobile gas generators. The combustible gas produced in the carbonization of wood is used for the production of dry gases.

3111. ALLNER, W. Die Gaserzeugung aus Holz nach dem Gleichstrom-Entgasungsverfahren Bubiag-Didier. **[The manufacture of gas from wood by the Bubiag-Didier parallel-flow carbonization process.]** *Gas- und Wasserfach, München* 90 (8), 1949 (175–6). 7 refs. [G.g.] D.S.I.R.

The gases obtained from carbonization are cracked by passage through the hot zone. Branches of Pine and other softwoods (moisture content 38·5%, ash content 0·3%) were cut into lengths of about 10 cm. A metric ton of wood yielded 178 kg. charcoal, 8·2 kg. tar, and 782 cu.m. of unpurified gas having a CO_2 content of 20·7%, and a calorific value of 2,520 kcal./kg. of raw fuel. After dry purification and removal of CO_2 to 2%, the volume of gas was 388 cu.m./ton of wood, and the heating value 3,980 kcal./cu.m. The charcoal contained only 3·7% volatile matter. Only 23% of it was in small pieces 5 mm. and under, 30% being in pieces between 5 and 15 mm. and 47% over 15 mm.

3112. RUTHERFORD, R. W., and RUSCHIN, K. **Ammonia synthesis gas from wood fuel.** *Industrial Chemist and Chemical Manufacturer, London* 25 (298), 1949 (521–4). O.R.S.

Abstract of a paper given at a meeting of the Institution of Chemical Engineers in London, October 11, 1949. Describes a plant in Southern India, near the forest area of Travancore, for the manufacture of producer gas from wood for use as a synthesis gas in the production of ammonium sulphate.

3113. STEVENS, J. E. **Components found in wood oil.** *Journal of the Tennessee Academy of Science, Nashville, Tenn.* 24 (3), 1949 (206–10). 7 refs. L.S. [Tennessee Products and Chemical Corporation, Nashville.]

Describes the process of wood distillation and the analysis of the 'light-acid oil' obtained by the fractionation of wood tar.

3114. ISOBE, H., HASEGAWA, K., and MIYAKE, I. **Light oil from dry distillation of wood.** *Bulletin of the Institute of Physical and Chemical Research, Tokyo* 20, 1941 (1008–11). *Chem. Abstr.* 43 (19), 1949 (7668). P.R.

Distillate of Japanese Cypress introduced into a reaction chamber containing a catalyst at 400–500° C. gave a stable oil of rather low efficiency.

33.39. Manufacture of Sugar, Oils, Alcohol, and Miscellaneous Chemical Products from Wood

See also *For. Abstr.* 11 (No. 2770).

3115. BLOEMEN, F. **Cellulose: saccharification.** *Brit. Patent* No. 621,024, April 4, 1949. *Abstr.* in *Summ. curr. Lit. Brit. Cott. Res. Ass.* 29 (24), 1949 (488). D.S.I.R.

Cellulose (e.g. wood) is ground to a powder and suspended in Bu alcohol that has been saturated with water, and HCl gas is pumped in under pressure (e.g. 1·5 kg. per sq. cm.) until the suspension is saturated (HCl concentration about 45%). Digestion is allowed to proceed for about 4 hours and then the liquid is evaporated under reduced pressure (25 mm., 50° C.), the Bu alcohol and HCl being recovered. Steam is then injected into the solid residue at about 120° C. to complete the hydrolysis.

3116. HÉRENG, A. **Cellulose saccharification [: a continuous method of extracting the pentoses and hexoses from comminuted wood by treatment with HCl.]** *U.S. Patent* No. 2,474,669, June 28, 1949. *Abstr.* in *Paper Tr. J.* 129 (21), 1949. P.R.

3117. YOSHIMURA, S. **Saccharification of wood.** *Japanese Patent* No. 172,843, May 31, 1946. *Chem. Abstr.* 43 (18), 1949 (7229). P.R.

The process uses HNO_3, $Fe(NO_3)_3$ or $FeSO_4$, and H_2SO_4 at high temperature and pressure.

3118. ABADIE, F. A. Contribution à l'étude de l'hydrolyse des celluloses de bois. **[Contribution to the study of the hydrolysis of wood cellulose.]** *C.R. Acad. Sci., Paris* 226 (19), 1948 (1539–41). 3 refs. [F.] D.S.I.R.

In the Brus-Faucounau process of wood hydrolysis [cf. *For. Abstr.* 9 (No. 1154)] the duration of the process is reduced by increasing the concentration of acid. Commercially practicable concentrations are between 7·5 and 30%. Below 7·5% the process is too slow, and above 30% the acid attacks the hydrocellulose, forming methanol and furfural, and reducing the yield of glucose. An empirical formula is given for calculating the yield of glucose in relation to acid concentration and the duration of the process.

3119. SAEMAN, J. F. Zur Kinetik der Hydrolyse des Holzes und der Zersetzung der Zucker in verdünnten Saüren bei hohen Temperaturen. **[Kinetics of the hydrolysis of wood and of the decomposition of sugars in dilute acids at high temperatures.]** *Holzforschung, Berlin* 4 (1), 1949 (1–14). 18 refs. [G.e.] *Transl.* from *Rep. U.S. For. Prod. Lab., Madison* No. 1457. [*For. Abstr.* 6 (181).] P.R.

3120. IVANOV, A. A. **Apparatus for percolation hydrolysis of wood.** *U.S.S.R. Patent* No. 69,875, Dec. 31, 1947. *Chem. Abstr.* 44 (1), 1950 (328). P.R.

33.5. Pitprops. Sleepers. Poles and Other Roughly Converted Wood

See also *For. Abstr.* 11 (Nos. 3079, 3084–9, 3142).

3121. Bergbau lehnt Weymouthskiefer als Stempelholz ab. **[The mines reject Weymouth Pine for pit-props.]** *Holz-Zentralblatt, Stuttgart* 76 (2/3), 1950 (13–4). [G.]

Results of strength tests on *Pinus strobus*, made in Bochum by the Westfalische Berggewerkschaftskasse. The data confirm the unsuitability of the species for mining timbers.

3122. ALLEN, J. W. **Split Douglas Fir mine lagging.** *Lumberm.* 76 (11), 1949 (16, 80).

Specifications for mine lagging of Douglas Fir in the Puget Sound area are briefly stated. Small old-growth or fine-grained second-growth trees are one source of supply. Salvage (i.e. long butts, snags, windfalls etc.) is also used.

3123. FISCHER, F. A indústria e comércio de 'dormentes'. **[The sleeper industry and market.]** *Brasil madeireiro* 5 (50), 1949 (21–5). [Port.]

Discusses the possibility of Brazil's entering the international market as an exporter of sleepers, gives dimensions of sleepers used in the U.S.A., Canada and some European countries, and presents illustrations showing methods of recovery from various dimensions of log.

3124. BASTOS, A. DE MIRANDA. Dormentes da Amazônia. **[Sleepers from Amazonia.]** *Brasil madeireiro* 4 (45), 1948 (11–2). [Port.]

Presents a list of Amazonian timbers traditionally suitable for railway sleepers, with their respective specific gravities.

3125. A Estrado de Ferro Sorocabana e a indústria madeireira. **[The Sorocabana Railway Co. and the timber industry.]** *Brasil madeireiro* 4 (42), 1948 (35–40). [Port.]

Discusses consumption of wood for fuel and sleepers by the Company, and includes a list of species with their calorific value, as determined at the Instituto de Pesquisas Tecnológicas.

3126. SHMAKOV, A. T. Mekhanizirovannaya opravka shpal. **[Mechanized finishing of sleepers.]** *Lesn. Prom.* 1949 (10), (12–14). [Russ.]

Standard Russian sleeper-cutting machines turn out sleepers which still require dressing on the two side faces. This work has hitherto been done by hand, but the Ministry of the Forest and Paper Industry has now started production of two types of machine for dressing the sides. These, which are briefly described, with photographs, are: (1) the ShOSD–7, a simple single-spindle type with one cutter head, driven by a 4·2-kw motor for the cutter and a 1·1-kw motor for the sleeper carriage, and capable of processing 500 sleepers per 8-hr. shift; (2) the ShOSD–5, a double-spindle machine with two cutter heads and built-in feed mechanism, all driven by a 12–15 kw motor and capable of an output of 1,500–2,000 sleepers per 8-hr. shift. Both types leave unbarked patches in hollows not exceeding 2–3% of the area of the sleeper sides; these must be finished by hand.

3127. WAKEFIELD, W. E., and KENNEDY, D. E. **Cat-faces and their effect on the strength of telephone poles.** *Mimeo. For. Prod. Lab., Can.* No. 0–132, 1949. pp. 4 + 3 photos. P.R.

The wood in the area surrounding a cat-face may be lower in strength than normal wood, may be heavily resinified in resinous species such as Pines, and may be separated from the surface of the wound by bark inclusions or a resinous film. It is therefore desirable to ensure that no cat-faces occur in areas where maximum stress is developed, generally at or near ground level. In other parts of the pole they are not likely to cause failure. They are undesirable in areas used for cross-arms.

3128. JÄNTTI, A. Suomen aitarakenteet. **[Fences in Finland.]** *Commun. Inst. for. Fenn.* No. 36 (2), 1948 (1949). pp. 42. 17 refs. [Fi.e.]

Part of a statistical investigation into grazing and fencing conditions in Finland. The present paper deals with length of different types of fence, the amount of wood and wire contained in the fences, the length of fence pulled down and new or rebuilt fences, in 1938.

33.6. *Packing Boxes, Crates, etc.*

3129. **Single and three-ply for boxes [: a brief description of box manufacture from different dimensions.]** *Veneers & Plyw.* 43 (10), 1949 (23–4). P.R.

3130. BOOTH, F. L. **Veneer in basket and crate manufacture.** *Veneers & Plyw.* 43 (11), 1949 (12–3). P.R.

Equipment and methods used in the manufacture of fruit baskets, hampers, bushel baskets, and other miscellaneous crates and containers, are described; veneer cores are used

for firewood or pit-props, or in the factory for basket handles and bottoms.

3131. STERN, E. G., and PRICE, A. E. **Effects of depth penetration on nail withdrawal resistance.** *Wooden Box & Crate, Washington, D.C.* 11 (2; 3), 1949 (21–5; 21–5). P.A.T.R.A.

Tests were carried out on the nail withdrawal resistance of different nails in structural-grade Southern Yellow Pine. Results, which are given in graphs and tables show: (1) that stronghold (annular ring) and screwtite (drive screw) nails are very much superior to the ordinary wire nails; (2) that the withdrawal resistance for nails of larger diameter is higher than was anticipated on the bases of direct relationship between withdrawal resistance and nail diameter; and (3) that the relationship of withdrawal resistance and variation of depth of shank penetration seems to be curvilinear. The specific gravity of the wood and the angle of annual growth rings to the nail axis have a consistent and significant effect on test data and allowance must be made for this in comparing results.

33.7. *Firewood*

See also *For. Abstr.* 11 (No. 3125).

3132. HEISKANEN, V. Uittorankojen nosto ja haloiksi teko. **[Hoisting log lengths and making them into fuelwood.]** *Papp. Trävarutidskr. Finl.* 31 (1), 1949 (4–5). [Fi.] P.R.

Fuelwood, of which more is now floated in Finland, is sawn in the forest into 2- or 4-m. lengths. Mechanical devices at the end of the floating channel eliminate several stages of handling. From the feeding troughs, into which they are shepherded by men with long hooks, the logs are lifted out by a 4-hook endless chain and cut by a circular saw on their way up the hoist, into 1-m. lengths. These drop off the hoist down a chute on the other side and are guided by a man operating movable baffles, either to a conveyor belt (direct to store or truck) or, if thick enough, first to mechanical splitters. This method has proved competitive in manpower and costs. Theoretically the hoisting rate should be 480 cu.m. per day. In practice, to date, about 300 cu.m. have been hoisted.

3133. TURNBULL, R. F. **Wood as fuel.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 175, 1949 (3).

Compares the calorific value of Australian timbers, with high and low moisture contents, with other fuels. Discusses the stages of combustion, the form of wood used as fuel (long wood, blocks, chipped wood or sawdust and shavings), and the need for controlled rate of feeding and air supply for efficient combustion.

3134. Energia térmica baseada na silvicultura. **[Thermal energy based on silviculture.]** *Brasil madeireiro* 4 (35), 1948 (33–4). [Port.]

Investigations by the Cia. de Energia Eléctrica da Bahia, to explore the possibilities of raising *Eucalyptus* to provide fuel for an electricity plant were begun in 1943 with plantations extending over an area of 2,000 ha. Preliminary results indicated that the cost (including planting and upkeep) would amount to about Cr.$0.05 per KWH.

33.8. *Other Manufactured Products*

See also *For. Abstr.* 11 (No. 2947).

3135. **'Aerolite' 300 in small boat construction.** *Bull. Aero-Res., Duxford* No. 86, 1950. pp. 4. P.R.

Describes with illustrations the manufacture of a pram dinghy and a racing dinghy using veneer skins.

3136. **Electrical equipment uses wood.** *Wood-Worker, Indianap.* 68 (1), 1949 (65). P.R.

Wood for electrical insulation should first be air-dried to the lowest moisture content possible (about 12%), and then subjected to a mild kiln schedule until moisture content of 6% is reached. The species used should be those with the greatest dimensional stability. Wood containing mineral streaks or deposits of salts should be avoided. Dense woods such as Maple, Birch, and Beech, are commonly used, and Hickory is suitable if light-weight material is excluded. Wood may be treated finally by soaking in crude linseed oil, by treatment with moisture-repellent varnish, or both.

3137. Dordi, E. B. **How to produce good cloth.** *Indian Textile Journal, Bombay* 59 (704), 1949 (708–12, 728). L.S.

Includes a list of the timbers (*Diospyros melanoxylon, Grewia tiliaefolia, Pterocarpus marsupium, Anogeissus latifolia, Ougeinia dalbergioides, Adina cordifolia* and *Gmelina arborea*) commonly used in India for various loom-parts.

3138. Hebblethwaite, C. H. **Laminated skis.** *For. Prod. News Lett. C.S.I.R.O. Aust.* No. 177, 1949 (3).

Lamination increases the number of Australian timbers suitable for ski manufacture and gives improvement in strength properties over skis from bent wood. A small press for laminated ski manufacture is described and illustrated, and recommendations on choice of timbers and glues, and on manufacturing methods, are given.

33.9. *Grading [including Standard Specifications] and Storage of Converted Timber*

See also *For. Abstr.* 11 (No. 2845).

3139. Siimes, F. E. **Methods of measuring properties and defects in sawn timber [in relation to grading].** [*Proceedings of the*] *First* [*F.A.O.*] *Conference on Mechanical Wood Technology, Geneva* 1949 (21–5, 68–70 + 3 gphs). [Wood Technology Laboratory, State Technical Research Institute of Helsinki, Finland.]

3140. Siimes, F. E. **Proposal of grading rules for stress-graded timber in Finland.** [*Proceedings of the*] *First* [*F.A.O.*] *Conference on Mechanical Wood Technology, Geneva* 1949 (71–3). [Wood Technology Laboratory, State Technical Research Institute of Helsinki, Finland.]

3141. Sousa, P. Ferreira de. Classificação de madeiras. **[Grading of timber.]** *Brasil madeireiro* 4 (35), 1948 (17–24). [Port.]

A short review of the development of grading practices in Brazil, with details of the regulations now in force.

3142. **Australian standard grading rules for sleepers for 24-in. gauge railway track (sugar cane industry) [with an appended list of 43 timbers suitable for sleepers].** *Aust. tech. Stand.* No. 0.57, 1949. pp. 8. Price 2*s.* P.R.

3143. **Australian standard schedule of dimensions of structural timbers for use in domestic building construction.** *Aust. tech. Stand.* No. 0.56 (revised) 1948. pp. 18. Price 2*s.* 6*d.* P.R.

3144. Classement des parquets en bois de pin maritime. **[The grading of *Pinus pinaster* flooring.]** *Bois & Résin.* 31 (1511), 1949 (1). [F.]

34. MINOR FOREST PRODUCTS AND THEIR UTILIZATION

3145. Fanshawe, D. B. **Forest products of British Guiana. Part II. Minor forest products.** *For. Bull. For. Dep. Brit. Guiana* No. 2, 1948. pp. 70. 45 refs.

34.2. *Vegetable Products*

See also *For. Abstr.* 11 (Nos. 2716–7).

34.24. Tanning Materials. Cork. Bark Products

See also *For. Abstr.* 11 (Nos. 2633, 3000–1, 3162, 3167, 3184, 3194, 3196).

3146. Neves, C. M. Baeta. Das relações entre a floresta como fonte de matérias primas, e a indústria. O caso dos produtos tanantes e a indústria de curtumes em Portugal. **[The relationship between the forests (as a source of raw material) and industry. The case of tannin production and the tanning industry in Portugal.]** *Publ. Serv. flor. aquic. Portugal* 10 (1), 1943 (273–80). [Port. e.]

Reviews sources of tannin in Portugal, and suggests that more extensive cultivation of *Acacia* spp. would help to increase production.

3147. Shaw, H. **Possibilities for co-ordinated Wattle research in the African region.** *Communication, African Regional Scientific Conference, Johannesburg* No. B (i) 2, 1949. pp. 4.

Summarizes the scope and programme of

research at the Wattle Research Institute of the University of Natal.

3148. BRYANT, L. H. **The exploitation of N.S.W. tannin-bearing species.** In *Symposium on the Native Tanning Materials of Australia*, [*Sydney*] 1946 (7–9). B.L.M.R.A.

The Wattle species giving best tannin yields are *Acacia mollissima* (with a yield from bark of good strains of 48–50%), *A. penninervis* (14–35%), *A. decurrens* (38%), *A. irrorata* (30–40%) and *A. binervata* (27–30%). These species are not timber trees and the barks could not be obtained as by-products; a possible exception is their use in a mixture with other species for Masonite. Average tannin content of *Eucalyptus rostrata*, the only Eucalypt worth considering as the basis for a tannin extract, is 11% for the bark and 2–14% for the wood. Figures for tannin from the bark of *Callitris calcarata* appear to vary from 10 to 32%; the extract is of good quality, but the output of bark would be only 20 tons a week, not enough to keep an extract plant going. *C. glauca* has a lower tannin content, about 12%, but the extract is of better quality. A preliminary survey indicates about 220 tons of bark a week to be available from sawmills in the White Cypress belt; as these mills are at the rail head and fairly closely grouped, consideration should be given to the establishment of an extract plant; also to the use of tannins from the sawdust of this species.

3149. PURSS, A., and ANDERSON, H. **A comparison of the properties of various tannins with special reference to *Eucalyptus sieberiana* and *Callitris calcarata*.** In *Symposium on the Native Tanning Materials of Australia*, [*Sydney*] 1946 (10–3). B.L.M.R.A.

Tannin from *C. calcarata* is a catechol tan with abnormally high acidity, excellent solubility, and high ratio of tans to non-tans, and gives high fixation, moderate penetration, and a firm but flexible leather; its natual colour is very red, but this can be corrected by sulphiting and treatment with antimony and aluminium salts. That from *E. sieberiana* is a pyrogallol tan of high acidity, giving a light-coloured mellow leather very similar to Myrobalans. It would seem to be an excellent material for blending with Mimosa to increase the acidity and improve the colour of the leather. Results of comparisons between these and other tannins (Myrobalan nuts and extract, Mangrove (*Rhizophora mucronata*), Chestnut, Mimosa, 'Myrtan', Mallet and Quebracho) are given in graphs and tables.

3150. ANDERSON, H. **Further experiments with *E. sieberiana* and *C. glauca* and an investigation of *E. rostrata* and *E. crebra* barks.** In *Symposium on the Native Tanning Materials of Australia*, [*Sydney*] 1946 (19–20). B.L.M.R.A.

Callitris glauca gave leather similar to Mimosa but slightly darker. *Eucalyptus rostrata* gave a fairly pale reddish leather. *E. crebra* gave a dark red, hard and brittle leather and displayed extremely slow penetration. *E. sieberiana* gave a leather intermediate in quality between Mimosa and Myrobalans. Sulphiting of the 3 catechol tans gave a marked improvement to extracts of *C. glauca* and *E. crebra* but not to *E. rostrata*. It appeared from experiments that, with judicious blending and proper finishing, all these materials would be suitable for sole-leather tannage. Tables are given showing the properties and colour of different tannins and blends.

3151. DUNN, A., and ANDERSON, H. **The use of Mangrove bark.** In *Symposium on the Native Tanning Materials of Australia*, [*Sydney*] 1946 (17–8). B.L.M.R.A.

Results of research on the extraction of Mangrove (*Rhizophora* sp.) bark, sulphiting of the tannin and treatment with metallic salts are discussed. The tannin has acidity and good solubility, and while it is probable that no amount of research will transform Mangrove into a really light-coloured tanning material, it is felt that further experiment might make it possible to increase appreciably the proportion of Mangrove in sole-leather tannages.

3152. BISHOP, C. T., HARWOOD, V. D., and PURVES, C. B. **Separation of some chemical constituents from White Spruce bark.** *Pulp Paper Mag. Can.* 51 (1), 1950 (90–2). 8 refs. [McGill University, Montreal.]

A pilot-plant extraction of air-dry bark of White Spruce [*Picea glauca*] with methanol yielded about 20% of soluble material, which was separated into aliphatic oils, fats, and waxes (1·5%), crude resin acids (1·5%), more complex phenolic substances (1·5%) and water-solubles (15·3%). Extraction of the bark residue with hot water removed an

additional 20%, which consisted mainly of glycosides of complex phenols. Hydrolysis with boiling 1% H_2SO recovered up to ½ of this amount as fermentable sugars. A similar hydrolysis of the original bark reduced about 15% to fermentable sugar and left the remainder in a condition which could be more easily dried. *From authors' summary.*

3153. Bope, F. W., and Gisvold, O. **A preliminary phytochemical examination of the tannin obtained from *Pinus caribaea* Morelet.** *J. Amer. pharm. Ass. (sci. Ed.)* 38 (4), 1949 (192–6). 8 refs. [University of Minnesota.] O.R.S.

3154. Snow, E. A. **Pine bark as a source of tannin.** *Journal of the American Leather Chemists Association, Easton, Pa.* 44 (7), 1949 (504–11). 4 refs. [Division of Forestry Relations, Tennessee Valley Authority.] L.S.

Mixed Pine barks (of *P. echinata, P. taeda* and *P. virginiana*) from pulp-mill waste contained 5·6% tannin and the extract gave good-quality leather in laboratory tests. Analyses of bark freshly peeled and after storage for periods of up to 8 weeks, showed no appreciable decrease in tannin content with ageing. Analyses were made on 84 samples of Pine bark from trees of the 3 species from different localities, of different size and at different heights of sampling. Results are tabulated. *P. echinata* and *P. taeda* both showed significant variation in tannin content with locality. Sawlog-size trees were found to have higher tannin contents than pulpwood-size trees. No correlation of tannin content with sampling height was found. Bark of *P. echinata* and *P. taeda* contained appreciable quantities of tannin, averaging 5·4 and 4·5% respectively. Both had a high bark volume in relation to the total volume of the merchantable log, averaging 18% for sawlog- and 24% for pulpwood-size trees. *P. virginiana* appeared uneconomic, with tannin content of 3·7% and bark volume of 13%. Analyses of inner and outer bark of *P. echinata* and *P. virginiana* showed that tannin from the inner bark was inferior in quantity and quality.

3155. Hubbard, J. K., and Kurth, E. F. **Douglas-Fir bark tannin.** *Journal of the American Leather Chemists Association, Easton, Pa.* 44 (8), 1949 (604–14). 10 refs. L.S.

Douglas-Fir bark contains 7·6–18·3% tannin, highest amounts being found in the bark from the tops of young trees and lowest in that from the butts of old trees. It produces leather of good quality. The tannin is soluble in cold water, yield being reduced when logs are floated in mill ponds; it belongs to the phlobatannin class and appears to be identical with that from Douglas-Fir wood. Results of analyses of the tannin are tabulated. Dihydroquercetin, a flavanone present in the bark in larger amounts than in the wood, is extracted with the tannin and is present in considerable quantity in the aqueous tannin extract. The ultra-violet absorption spectra of phlobaphene and the bark tannin are similar to that of dihydroquercetin.

3156. Kurth, E. F. **The chemical analysis of western woods. Part II. Douglas Fir bark analysis.** *Tappi* 32 (4), 1949 (175–6). 5 refs. L.S.

[Cf. *For. Abstr.* 10 (No. 1125).] Douglas-Fir bark and its mechanically separated components (cork particles, short needle-like fibres and bark powder) were analysed by conventional wood-analysis methods. The cork fraction is largely insoluble in the 72% H_2SO_4 used in the conventional lignin determination; therefore accurate quantitative determination is impossible. The methoxyl content of the 'lignin' residue from the whole bark sample was 6·12%, and that from the fibres 7·16% or less than half that of softwood lignins. The low methoxyl 'lignin' is most abundant in the bark-powder fraction. Although the fibrous fraction appeared to be a ligno-cellulose substance, use of the conventional methods of analysis for cellulose appeared to be impracticable. An acetic-acid content of 3·3–5·1% of the fibrous component is indicated.

3157. Sievers, A. F., and Clarke, I. D. **Methods of drying Sumac.** *Journal of the American Leather Chemists Association, Easton, Pa.* 44 (8), 1949 (573–96). 5 refs. L.S.

Experiments were conducted in Maryland and Virginia, under laboratory and field conditions, with *Rhus copallina, R. glabra*, and *R. typhina* to determine the effect of different methods of drying on tannin content and other characteristics affecting the value of the leaves for tanning and as a source of tannin extract. When leaves were kiln-dried at high temperatures there was a slight but not serious loss

(about 1%) of tannin, and possibly a very slight increase in non-tannins. Leather tanned with kiln-dried material was lighter in colour than that from air-dried material, but the leather yield and the combined tannin in the leather were both low. Any method of air drying is satisfactory if it is rapid; leaves dried rapidly with good aeration produced good light-coloured leather, those dried more slowly dark leather. Rate of drying did not affect tannin content. Drying in a swath is excellent in suitable weather and takes 5–6 days; swath-dried material gave one of the best lots of leather. In regions where the weather is uncertain, drying under cover in an open shed or well ventilated barn is preferable. Drying Sumac in a small wood-fired kiln proved expensive but would be less so on the farm. Partial air drying for several days in good weather followed by a short period of kiln drying gave reduced costs and a good quality material. A tobacco drier also gave good-quality material but the cost of drying Sumac by this method would probably be too high. Results are tabulated.

3158. ANWAY, H. W. **Method of treating bark.** *U.S. Patent* No. 2,437,672, Mar. 16, 1948. *Biol. Abstr.* 23 (5), 1949 (16761).

Bark with 30–80% moisture is washed, chopped and screened, then ground in a hammer mill, dried to 15–25% moisture, and screened with a 48-mesh screen to get bark powder. The material not passing the screen is sent to a ball mill and after grinding is screened again on a 48-mesh screen. The material passing the screen is combined with the above and ground in a micro-pulverizer. The material not passing the screen is screened on 14- and 28-mesh screens to get cork and bast fibres or stove cells. Douglas-Fir bark yielded 19% cork, 18% intermediate product (fibres) and 63% bark powder.

34.25. Christmas Trees. Medicinal and Edible Plants

3159. **Treating Spruce and Balsam Fir Christmas trees to reduce fire hazard.** *Tech. Note U.S. For. Prod. Lab., Madison* No. 250 (rev.), 1949. pp. 4. P.R.

Water treatment [see *For. Abstr.* 3 (p. 238) of which this is a revision] is the best method for reducing danger of fire and for preventing discoloration and falling of needles. Additional fire protection can be given by use of fire-retardant coatings as well as the water method, if retention of the natural colour is not important. Formulae are given for decorative coatings, 1 transparent and colourless, 1 cream-coloured and 1 frosty-white in colour; the 2 last can be tinted with suitable dyes. Experiments on the introduction of fire-retardant chemicals into Spruce have caused one or more of the following: needle discoloration, needle fall, and increased combustibility. The last is due to the fact that chemical solutions were not taken up by the tree so rapidly or in such large amounts as water. Trees actually lost weight during the process. $(NH_4)_2SO_4$ caused serious discoloration of Spruce and Balsam Fir needles. Spruce needles started to fall after 2 and were falling freely after 5 days. Both species treated with $(NH_4)_2\ SO_4$ burnt more readily than specimens treated with water; Spruce burnt more readily than Balsam Fir.

3160. VALENZUELA, P., CONCHA, J. A., and SANTOS, A. C. **Constituents, uses and pharmacopœias of some Philippine medicinal plants.** *Philipp. J. For.* 6 (1), 1949 (39–111). 305 refs.

3161. CHATTERJEE, R. **The rasāñjana of the Hindus.** *Lloydia* 12 (3), 1950 (178–82). 28 refs. P.R.

An historical account of the preparation, properties and uses of rasāñjana, a drug extracted from the root, stem and bark of *Berberis* spp.

3162. YOUNGKEN, H. W. **Observations on the bark of *Remijia pedunculata*.** *J. Amer. pharm. Ass.* (*sci. Ed.*). 38 (1), 1949 (27–30). 4 refs. [Massachusetts College of Pharmacy, Boston.] O.R.S.

The physical characteristics, histology, and the powdered form of the bark, and a test for the presence in it of *Cinchona* alkaloids are described. The bark, from a Colombian tree, yields substantial amounts of quinidine and quinine and is an important source of quinidine sulphate. [Cf. *For. Abstr.* 7 (No. 1363).]

3163. PRICE, J. R., and CROW, W. D. **Alkaloids of the Australian Rutaceae: *Melicope fareana*. 1. Isolation of the**

constituent alkaloids. 2. Preliminary examination of melicopine, melicopidine and melicopicine. 3. Oxidative demethylation of melicopicine. 4. Some reactions of 1-methyl-4-quinolone-3-carboxylic acid, a degradation product of the alkaloids. 5. The structure of the alkaloids. *Aust. J. Sci. Res.* 2*A* (2), 1949 (249–306). 54 refs. P.R.

3164. PARIS, R. Sur un *Erythrophleum* d'Indochine: le 'lim' (*E. fordii* Oliver). **[An *Erythrophleum* from Indo-China [:botanical, anatomical and chemical description].** *Annales pharmaceutiques françaises, Paris* 6 (11/12), 1948 (501–7). 12 refs. [F.] [Laboratoire de Matière médicale de la Faculté de Pharmacie de Paris.] L.S.

3165. PLANCHE, O. Le *Psorospermum guineense* Hochr. ou 'kari-diakouma' de la Guinée française. **[*Psorospermum guineense* from French Guinea [: botanical, anatomical and chemical description.]** *Annales pharmaceutiques françaises, Paris* 6 (11/12), 1948 (546–65). 23 refs. [F.] [Faculté de Pharmacie de Paris.] L.S.

3166. MONACHINO, J. ***Strophanthus*, sarmentogenin and cortisone. The botanical aspects of the story of the newest 'miracle drug'.** *J. N.Y. bot. Gdn.* 51 (602), 1950 (25–39). 22 refs.

Discusses the botanical and other problems related to the production of sarmentogenin (for the synthesis of cortisone) from *Strophanthus* sp. [Cf. *For. Abstr.* 11 (p. 425).]

3167. GAZET DU CHATELIER, G. Sur les caractères distinctifs des poudres d'écorces de chêne, de cascara sagrada et de bourdaine. **[Distinctive characteristics of bark powders of Oak, Cascara sagrada and Buckthorn.]** *Annales pharmaceutiques françaises, Paris* 6 (11/12), 1948 (507–10). [F.f.] [Faculté de Pharmacie de Strasbourg.] L.S.

Microscopic examination of powdered bark of *Q. robur*, *R. purshiana* and *R. frangula* gives rapid identification of the three, considered as isolated powders or in a mixture.

3168. HOUGH, L., JONES, J. K. N., and HIRST, E. L. **Chemical constitution of Slippery Elm [*Ulmus fulva*] mucilage: isolation of 3-methyl D-galactose from the hydrolysis products.** *Nature, Lond.* 165 (4184), 1950 (34–5). 10 refs.

3169. SABALITSCHKA, T., and KLEFFNER, U. **The influence of age and the season of the year on the vitamin C contents of Spruce and Pine needles.** *Pharmazie, Berlin* 1, 1946 (90–2). *Chem. Abstr.* 41, 1947 (5922). O.R.S.

Vitamin C was determined in the needles of *Picea abies* and of *Pinus sylvestris* at varying ages and at various seasons of the year. The needles of both conifers were highest in vitamin C in the fresh substance from February to April. The young Spruce needles growing in the spring, contained less ascorbic acid in the fresh substance than the needles of previous years. This is attributed to the higher water content of the young needles. When the vitamin C content is calculated on the dry substance, then the value for the young spring needles is as high as or higher than that of the older needles. It is recommended that extracts be prepared from fresh needles.

3170. Grandes riquezas de vitaminas no miriti. **[Great wealth of vitamins in Miriti.]** *Brasil madeireiro* 4 (37), 1948 (30). [Port.]

A chemical analysis of the fruit pulp of *Mauritia* sp.

34.26. Resin. Turpentine. Oils. Gums

See also *For. Abstr.* 11 (No. 3168).

3171. HOWES, F. N. **Vegetable gums and resins.** Chronica Botanica Co., Waltham, Mass., U.S.A. 1949. pp. xxiv + 188. Numerous refs. I.F.B.

This work, which is chiefly concerned with gums and resins of commercial importance or otherwise of special interest, falls into two parts. Part I—Gums, with chapters on: their nature and uses, gum arabic and other Acacia gums, gum tragacanth and similar gums, Asiatic gums, New World gums, miscellaneous and little known gums. Part II—Resins, with chapters on: properties and uses, the copals, rosin, kauri resin, lac resin and shellac, some little used varnish resins, elemi, natural lacquers, frankincense and myrrh, medicinal and other resins. The bibliography contains 177 references.

3172. Snow, A. G., Jr. **Research on the improvement of turpentine practices.** *Econ. Bot.* 3 (4), 1949 (375–94). 17 refs.

Reviews the history of the industry and research done in the U.S.A. on improved tapping methods, and the breeding of high-yielding trees.

3173. True, R. P., and Snow, A. G., Jr. **Gum flow from turpentine Pines inoculated with the pitch-canker *Fusarium*.** *J. For.* 47 (11), 1949 (894–9). 6 refs.

Treating freshly cut virgin faces with the pitch-canker fungus, *Fusarium lateritium* f. *pini*, prolonged the period of commercially adequate resin flow (normally 1 week) to an average of 5 weeks for Slash Pine [*P. caribaea*] and 3 weeks for Longleaf Pine [*P. palustris*]. Later freshening and retreatment of the same faces prolonged adequate flow for an average of 3 weeks with *P. caribaea* and for usually not more than 2 weeks with *P. palustris*. No reason is known to account for the difference between the prolongation induced by the initial and by later treatments. Decision on the commercial usefulness of the fungus as a resin-flow stimulant must await the results of further investigation. [Cf. *For. Abstr.* 11 (No. 1394).] *From authors' summary.*

3174. Hepting, G. H., and Clapper, R. B. **Pine gum flow following *Fusarium* inoculation.** *Abstr.* in *Phytopathology* 40 (1), 1950 (12).

Cf. *For. Abstr.* 11 (No. 1394).

3175. Clements, R. W. **Results of 1948 pilot-plant tests of chemical stimulation.** *Naval Stores Rev.* 59 (35), 1949 (16, 26–7).

Continuing previous tests at the Southeastern Forest Experiment Station [cf. *For. Abstr.* 10 (No. 2865)], *Pinus caribaea* was subjected to (1) bi-weekly freshening ('bark chipping') and treatment with a 50% concentration of H_2SO_4, and (2) weekly untreated freshening by the old method. Treatment (1) yielded 20% more resin, eliminated about half the freshening labour and saved $2.47 (allowing for equipment and acid costs) on the $5.50 per barrel of resin that (2) cost. Increase of yield through method (1), however, varies widely according to the quality of the work. It is suggested, therefore, that part of the saving should go to the labourer in increased rates, so as to encourage good work.

3176. Clements, R. W. **Good gum grades obtained with acid treatment.** *Naval Stores Rev.* 59 (40), 1949 (16, 26–7). [Lake City Branch, Southeastern Forest Experiment Station.]

A comparison of resin grades obtained in pilot-plant tests lasting over a period of 3 years, shows that the resin from acid-treated trees is of at least as high quality as that from untreated trees. Respective proportions of the higher grades were 46 and 40%. It is important, however, to avoid the use of too much acid if good grades are to be obtained.

3177. Snow, A. G. Jr., and Clements, R. W. **Raising tins on bark-chipped faces.** *Naval Stores Rev.* 59 (44), 1950 (14–5).

The use of one spiral gutter [cf. *For. Abstr.* 11 (No. 574)] and one straight gutter is recommended for both flat metal cups and flower-pot-type cups. If tapered tacks are used to fasten the gutters directly to the face, they can be removed with ease in raising operations.

3178. Leicher, A. H. Procédé d'extraction de la résine. **[Method for resin-extraction.]** *Fr. Patent* No. 947,660, July 8, 1949. [F.] *Abstr.* in *Rev. Bois Appl.* 5 (2), 1950 (35).

Containers, preferably of sheet metal, have one side open, with cutting edges which can be driven 12–15 mm. into the wood, thus forming air-tight compartments. These are linked by a system of tubing with a central tank for circulating a solvent, preferable dichloromethane with the formula CH_2Cl_2 which will not damage the trees, in quantities equal to 1 litre to each container in 24 hr. The resin is completely dissolved in the solvent and, as this eliminates the variation in consistency with changes in temperature, it can be collected throughout the cold weather. There will be no oxidation of the resin on the cut face, and therefore no need to move the containers. The contents of the containers are discharged into the central reservoir; the solvent is separated from the resin by distillation and returned to the circulating system; the resin is collected for further treatment.

3179. Mirov, M. T., Wang, T. H., Haagen-Smit, A. J., and Thurlow, J. **Chemical composition of gum turpentines of Pines: a report on *Pinus strobus*,**

***P. cembra, P. taeda, P. radiata* and *P. virginiana*. Composition of gum turpentine of *P. lambertiana*.** *J. Amer. pharm. Ass. (sci. Ed.)* 38 (7), 1949 (403–9). 7 refs. O.R.S.

3180. FERNANDES, J. Sôbre o óleo resina de copaiba e sua aplicação industrial. **[Copaiba balsam and its industrial application.]** *Brasil madeireiro* 5 (49), 1949 (28–9). [Port.]

Properties of the oil and some of its uses.

3181. PENFOLD, A. R. **Grass Tree resin—gum accroides.** *Journal of the Oil and Colour Chemists' Association, Cambridge* 32 (348), 1949 (271–8). 60 refs. L.S.

The economics, production, properties, uses and chemical composition of the resin from the Grass Tree (*Xanthorrhoea* spp.) are reviewed. *From author's summary.*

3182. GATTEFOSSÉ, J., and IGOLEN, G. **Essential oils of the leaves of Thuja of Barbary.** *Industrie de la Parfumerie, Paris* 4, 1949 (35–6). *Chem. Abstr.* 43 (12), 1949 (4814). P.R.

Callitris articulata grows abundantly in the southwest of Morocco and yields gum sandarac. By steam distillation the leaves, young shoots and twigs yield 1% of an essential oil, light yellow and with a turpentine and borneol odour. The principal components are *d*-α-pinene, *d*-borneol and bornyl acetate.

3183. BATT, R. D., and HASSELL, C. H. **The essential oil of *Libocedrus bidwillii*—New Zealand Cedar.** *J. Soc. chem. Ind.* 68 (12), 1949 (359–61). 34 refs. P.R.

The following constituents have been separated from the oil: *l*-α-pinene (24·8%); *d*-sabinene (3·3%); myrcene (2·7%); ketone ($C_{10}H_{16}O$) (3·7%); limonene and dipentene (7·4%); *p*-cymene (3·4%); terpinolene (0·7%); terpinen-4-ol (1·2%); unidentified tricylic sesquiterpene (1·6%); unidentified sesquiterpene (3·7%); caryophyllene (3·0%); γ-curcumene (18·4%); *d*-cadinene (2·7%); green oil (5·8%); and tar, including hydrocarbon, (8·2%).

3184. HENCH, M. H. **Distillation of Black Birch for oil.** *For. Leaves* 34 (4), 1949 (4–5, 14).

Describes the process of distilling wintergreen oil from bark, twigs and leaves of *Betula lenta* in the woods of Pennsylvania. The industry is threatened with extinction by the manufacture of synthetic oil of wintergreen.

3185. OKAY, M. I., and GÜRGEN, A. R. Türkiye Okaliptüs yağlari üzerinde bir araştirma. **[Investigations on Turkish Eucalyptus oils.]** *Ankara Yüksek Ziraat Enstitüsü Dergisi* 5 (1) (Ser. No. 9), 1945 (127–47). [Turk.turk.]

Leaves of 3 species and some natural hybrids in the Karabucak plantations at Tarsus were steam distilled and gave oil contents as follows: Fresh leaves, *E. globulus* 1·64%, *E. rostrata* 0·61%, *E. viminalis* 2·12%, hybrids 0·95%; shade-dried leaves 1·33%; leaves cut 5 months previously and kept in the sun, 0·51%. Leaves sun-dried for any length of time lost nearly half their oil content. The authors consider it would be preferable to distil fresh leaves, as, although shade-dried leaves lose little if any oil, drying results in no appreciable saving in bulk.

3186. BERRY, P. A. **Field observations of the seasonal variations in the yields of the essential oil of *Eucalyptus cneorifolia*.** *Australian Chemical Institute Journal and Proceedings, Melbourne* 14 (5), 1947 (173–5). L.S.

The yield of oil increases from September onwards, culminating in a flush period associated with rapid growth of the young tips. The flush period varies from year to year in onset, intensity, and duration, and is dependent on climatic conditions and rainfall. The peak usually occurs in the early part of December. These observations made it possible to select the optimum time for collecting the young tips for distillation. The maximum yields of oil, associated with maximum terpene contents were thus obtained.

3187. BERRY, P. A. **The seasonal variation of the essential oil from the growing tips of *E[ucalyptus] cneorifolia* with special reference to the occurrence of cymene.** *Australian Chemical Institute Journal and Proceedings, Melbourne* 14 (5), 1947 (176–200). L.S.

3188. CALDER, A. J., and CARTER, C. L. **The essential oil of *Pittosporum tenuifolium*.** *J. Soc. chem. Ind.* 68 (12), 1949 (355–6). 7 refs. P.R.

The oil of *P. tenuifolium*, the chief constituent of which is *d*-α-pinene, offers a striking

contrast to that of *P. eugenioides*, the main portion of which consists of *n*-nonane. [Cf. *For. Abstr.* 10 (No. 2881).] *Authors' summary.*

3189. Baslas, K. K., and Deshapande, S. S. **Essential oil from the leaves of Bêl (*Aegle marmelos*).** *Journal of the Indian Chemical Society, Calcutta* 26 (5), 1949 (231–4). O.R.S. [Agra College, Agra.]

The chief component (about 56%) of the oil is α-*d*-phellandrene.

3190. Bhati, A. R., and Deshapande, S. S. **Essential oil from the leaves of *Feronia elephantum*, Corr.** *Journal of the Indian Chemical Society, Calcutta* 26 (7), 1949 (342–4). O.R.S. [Agra College, Agra.]

The chief component (about 90%) of the oil is estragol.

3191. Cornea, J., and Rudenco, A. Nouvelles matières premières pour l'industrie des huiles végétales. III. Analyse de la faîne, de l'huile de la faîne, des acides gras et des résidus d'extraction. **[New primary materials for the vegetable-oil industry. III. Analysis of Beechnuts, Beechnut oil, their fatty acids and the residue left after extraction.]** *Bulletin d'Études et de Recherches Techniques, Bucharest* 1949 (1), (169–81). 27 refs. [F.f.russ.] A.C.P.

The authors first briefly review the existing literature and then report on their own analysis of Beechnut grown in Rumania. They obtained a yield of oil representing 41·10% of the kernels, and about 25% of the entire mast. The oil contained a total of fatty acids amounting to 94·04%, and of this total, 75·62% was oleic acid—almost the same proportion as is found in Olive oil. The residue of the kernels, after extraction, contained 42·5% of proteins. The possibilities of collecting and processing Beechmast on a commercial scale are discussed; the oil is suitable for human consumption and the residue either for that or animal fodder. The husks might be used as fuel.

3192. Phadnis, K. D., Rege, A. V., Pishavikar, D. G., and Shah, S. V. **A study of oil from the seeds of *Mesua ferrea* (N. O. Guttiferae).** *Journal of the University of Bombay* (*n.s.*) 17 (5*A*), 1949 (65–8). [Rajaram College, Kolhapur.] C.G.B.

3193. Howes, F. N. **The Chinese Tallow Tree (*Sapium sebiferum* Roxb.)—a source of drying oil.** *Kew Bull.* No. 4, 1949 (573–80). 10 refs.

A description of the tree, its distribution and methods of preparing the tallow, with a chemical analysis of the seed oil.

3194. Solutzev, A. A. **Composition of oil from bark of Linden trees.** *C.R. (Doklady) Acad. Sci. URSS* 30, 1941 (834–5). *Brit. Abstr.* BII, 1946 (385). O.R.S.

3195. Trancoso, A. de Medeiros. Algumas observações sôbre o carandá em Mato Grosso. Cêra semelhante á de carnaúba. **[Some notes on *Copernicia australis* in Mato Grosso. Wax similar to carnauba.]** *Brasil madeireiro* 4 (45), 1948 (33–4). [Port.]

Includes a chemical analysis of the wax.

3196. Hellinga, A. Arabische gom leverende gewassen. **[Trees producing gum arabic.]** *Rapp. Bosbouwproefsta, Buitenzorg* No. 21, 1949. pp. 5. [Du.Jav.e.]

Experiments on the growth of gum-producing *Acacia* species in Indonesia show that *A. senegal*, *A. arabica*, *A. karroo* and *A. stenocarpa* give good results. Their cultivation by the native population in the east of the archipelago is recommended, with the use of the timber for fuel and construction, the bark for textiles and tanning, and the leaves and fruit as fodder, in addition to the collection of the gum arabic.

34.27. Seeds. Fruits. Leaf Fodder

See also *For. Abstr.* 11 (Nos. 2614, 3170, 3191–3, 3196).

3197 Lüers, H., Diemair, W., and Gergs, W. **Horse chestnuts.** *Zeitschrift für Lebensmittel-Untersuchung und -Forschung, Berlin* 88, 1948 (353–66). *Chem. Abstr.* 43 (4), 1949 (1498). P.R.

The analyses were made because of the general interest in using Horse-Chestnuts for technical and edible purposes. Horse-Chestnut meal contained moisture 10·83, fat 5·04, N 1·276, protein 8·93, starch 36·7, ash 2·98, P_2O_5 0·546, pentosans 6·68, fibre 8·44, S 0·531 and tannin and bitter materials 8–13%. Analyses of the oil, fatty acids, and proteins are given. The meal contained 10–14% saponins that should be useful for technical purposes.

They have the bitter taste of the original meal and contain a factor which hinders the processing of raw meal by enzymes or fermentation. To allow successful fermentation, the saponins are removed with MeOH or rendered inactive by autoclaving in acid media. Some meal was autoclaved in acid media, and neutralized to pH 5–6, and the starch was converted to sugar in good yield by an enzymic process.

3198. Miloševič-Brevinac, M. Nekoliko podataka o lisničkim šumama u Srbiji. **[A few details about the fodder forests of Serbia.]** *Šum. List* 72 (7), 1948 (201–12). [Serb.]

An account, with numerous illustrations, of the widespread lopping for winter fodder in Serbia's overpopulated, mountainous districts. Species chiefly lopped, in order of importance, are: Oak (deciduous species), Beech, *Populus alba*, *Salix* species, *Robinia pseudoacacia* and *Vitis vinifera*.

3199. Maymone, B., and Tiberio, M. Ricerche sulla digeribilità e sul valore nutritivo delle foglie di edera (*Hedera helix* L.). **[Researches on the digestibility and nutritive value of Ivy leaves.]** *Ann Sper. agr.* (*n.s.*) 3 (1), 1949 (37–51). [It.it.e.] C.G.B.

3200. Williamson, J. El problema forrajero en la Pampa Central. **[The fodder problem in the central Pampas Territory.]** *Rev. argent. Agron.* 16 (4), 1949 (252–4). [Span.] E.M.B.

It has been noticed during recent years that cattle will eat leaves of *Eucalyptus*, especially *E. rostrata* and *E. ovata*, and it is suggested that these species might be grown in the Pampas Territory to provide forage during periods of scarcity. *E. rostrata* is particularly suitable, because it produces a large number of lateral branches, and coppices easily.

34.3. *Products of the Animal Kingdom*

See *For. Abstr.* 11
(Nos. 2445, 2566, 2580, 3459).

35. SALE AND DISPOSAL OF FOREST PRODUCTS. TIMBER TRADE

See also *For. Abstr.* 11
(Nos. 2450–2, 2459–60, 2462, 3123–5).

3201. **Timber statistics, including market reports, for January-March 1948 and 1949.** *Quart. Bull. Timb. Statist. FAO* 2 (1), 1949. pp. 124. [E.F.]

Cf. *For. Abstr.* 10 [No. 2194].

3202. **European recovery programme: Lumber and lumber products commodity study.** Economic Cooperation Administration, Washington, D.C. 1949. pp. 35.

3203. Donald, P. G. **Colonial timber policy.** *Timb. Tr. J.* 190 (3802–4), 1949 (669–72; 830–1).

A review of the present position, giving suggestions for improving the production of Empire hardwoods, a list of British Honduras hardwoods with appropriate uses, and figures for the area of forest land and the forestry staffs employed in different countries of the British Commonwealth.

3204. Jennings, L. G. **United Kingdom home production of timber [softwood, hardwood, pitwood and plywood] in recent years [1940–1948].** *Quart. Rev. Timb. Developm. Ass., Lond.* 2 (8), 1950 (6).

3205. Steer, H. B. **Lumber production in the United States 1799–1946.** *Misc. Publ. U.S. Dep. Agric.* No. 669, 1948. pp. 233. 57 refs.

The greater part of this work consists of a series of 85 tables.

3206. Dietrich, A. C. **Historical Southern lumber production facts.** *Sth. Lumberm.* 179 (2249), 1949 (189–92).

Presents production figures for 1869 to 1947.

3207. Mercado uruguaio para madeiras brasileiras. Sugestões do I.N.P. junto à comissão que realizará entendimentos comerciais com as autoridades do país vizinho. **[Uruguayan market for Brazilian timber. Suggestions of the Instituto Nacional do Pinho concerning a commission for bringing about commercial understandings with the authorities of the neighbouring country.]** *Brasil madeireiro* 5 (50), 1949 (13–20). [Port.]

Includes figures for Brazilian exports to Uruguay from 1937–48.

3208. Gregson, F. **Production and distribution of timber in W.A.** *Aust. Timb. J.* 15 (6–8), 1949 (407; 456; 553, 595–6).

Discusses the policy of Western Australia in retaining the greater quantity of its hardwood

production within the state, analyses the state's requirements and reviews the situation with regard to foreign markets.

38. CONSTRUCTIONAL WORKS. ENGINEERING

See also *For. Abstr.* 11 (Nos. 2762).

38.2. *Building Construction. Foundations and Superstructures*

See also *For. Abstr.* 11 (Nos. 2749–50, 2761, 2799, 2928, 3083, 3143–4).

3209. GIORDANO, G. La moderna technica delle costruzioni in legno. **[Modern technique of building construction in wood.]** Hoepli, Milan. 1947. pp. xv + 254 + 205 diagrams. 116 refs. [It.]

Includes sections on mechanical properties of wood (40 pp.); calculation of stresses for constructional members in wood (120 pp.); joints, including timber connectors and glue joints (88 pp.); costs and defects of wood as building material (11 pp.); building materials derived from wood, i.e. compressed, impregnated, laminated etc. wood, building board etc. (12 pp.); the principal types of wooden structure, i.e. roofs, bridges etc. (124 pp.); the principal Italian species of constructional timber (3 pp.); standards for the mechanical and physical strength of timber (8 pp.). There are over 200 diagrams and 62 tables in the text, and a separately bound supplement with 60 graphs showing different combinations of loads and stresses, and 26 plans and diagrams for particular constructions.

3210. REECE, P. O. **An introduction to timber structures.** E. & F. N. Spon Ltd., 22 Henrietta Street, London, W.C.2. 1949. pp. 235. 90 refs. [Timber Development Association.] Price 16*s*.

An introductory text book containing chapters on: the structure and composition of wood; characteristics of wood, and some related properties; elastic bodies and external forces; wood in relation to elastic theory; some strength values of clear wood; statistical analysis, the selection and grading of timber; loads, designs and stresses; beams, columns and struts; connections; and plywood. There are numerous photographs, diagrams, graphs and tables, and examples of the working of different calculations used in structural design.

3211. SELBERG, A. Knekning av sammensatte søiler av tre. **[Buckling of composite columns of wood.]** *Teknisk Tidskrift, Norrköping* 78 (35), 1948 (605–24). 4 refs. [Nor.] L.S.

Presents, with examples, formulae for calculating the buckling and breaking loads of wooden columns built up with timber connectors.

3212. DIETZ, A. G. H. [Ed]. **Engineering laminates.** John Wiley & Sons, Inc., New York. Chapman & Hall, Ltd., London. 1949. pp. 797. 466 refs. P.R.

A comprehensive work including sections on: strength of laminates and sandwich structural materials; adhesives; glued-laminated wood; plywood; composite laminated-wood/concrete construction; plastics-based laminates; sandwich-type building boards with insulation-board cores; plastic-surfaced plywoods and their properties; structural-sandwich construction; metal laminates of different kinds; rubber laminates; and the moulding of laminates and structural materials. For each material covered, design, manufacture, mechanics, properties, uses and other characteristics are discussed. There are numerous illustrations, graphs and tables, and an extensive bibliography.

3213. WALTERS, R. T. **Glued laminated timber structures.** *Construct. Res. Bull. Timb. Developm. Ass., Lond.* No. 5, [1949]. pp. 12. 7 refs. P.R.

Discusses the advantages of lamination, adhesive requirements, designs, and early work in Europe, and gives details and illustrated examples of American progress, with particular notice of the bowstring truss and fabrication methods, and of Swedish technique.

3214. KENNEDY, D. E. **Glued laminated construction.** *Mimeo. For. Prod. Lab., Can.* No. 0–117, 1949. pp. 17 + 4 dgms. 2 refs. P.R.

Discusses briefly the history and advantages and disadvantages of laminated structures, types of glue, gluing processes, moisture content and quality of wood, and the strength properties of different sections and of arches and curved truss chords.

3215. **Glued laminated arch: Report of tests carried out by the Canadian Forest Products Laboratory, Department of Mines and Resources.** With a note by Phillip O. Reece (Director, T.D.A.). *Emp. For. Rev.* 28 (4), 1949 (364–6).

Cf. *For. Abstr.* 11 (No. 2217).

3216. AREND, A. G. **Plywood for modern prefab construction.** *Woodwkg. Ind.* 6 (12), 1949 (729–31). P.R.

Discusses gluing techniques, the use of plywood for the mass production of fittings and structural items, and types of interlocking devices.

3217. SAVIO, J. Puutaloteollisuuden ajankohtaisia kysymyksiä. **[Topical problems of the prefabricated-wooden-house industry.]** *Metsät. Aikak.* 1949 (2), (59–62). [Fi.]

In the space of 8 years this industry has grown into a factor of the utmost importance in Finland's economic life, both on the home and foreign markets. It has also played a valuable part in reparation payments. By contrast the far older Swedish prefabricated-house industry supplies mainly its home market. Types of construction in Finland differ considerably from those in Sweden. There production is concentrated mainly on the so-called 'plank' house, whereas in Finland a design using the minimum of timber is favoured, only the stress-bearing members being made of wood. The insulation problem is solved by the use of porous insulation boards, developments here, and in the use of boards and battens, following American lines. Prefabricated-house design and production in Finland now embrace public buildings, such as schools, hospitals, hotels and clubs, which may be two-storeyed and have a floor space of as much as 4,000 sq. m. Export of school buildings has already begun. Various types of service buildings for forestry are also a prominent feature of production.

3218. **Use of timber in all building work.** *Economy Memorandum, Ministry of Works, London* Timber No. 2 (rev. of P.1.80), 1949. pp. 15. 22 refs. Price 6*d*.

Makes general recommendations on design, construction and sizes of stock to be used, with details of supply. Tabulates the restrictions on the use of softwood for 60 structural items and fittings used in buildings, and suggests alternative materials. Gives tables showing the maximum sizes of timbers for joists, rafters, purlins and floorboards. Discusses principles for placing timber containing large knots. Lists species, qualities and nominal dimensions of softwood timbers commonly available in Great Britain, and classifies hardwoods as light and medium, indicating suitable uses.

3219. **Still more softwood economy.** *Timber News* 57 (2126), 1949 (487–8).

A letter from the Ministry of Health to all housing authorities explaining the revised Timber Economy Memorandum [see preceding abstract]. A table showing the timber content of a typical house is given, and particular economies and the use of other materials and methods are discussed.

3220. **T.D.A. standard industrial truss, type A.** *Design Sheet Timb. Developm. Ass., Lond.* Nos. 9–12, [1949]. pp. 3 + 3 + 3 + 3. P.R.

Diagrams are given for design and details of trusses with clear spans between brick piers, ranging from 16 ft. 6 in. to 40 ft. 7 in. where no ceiling is required. The designs can be adapted to smaller clear spans provided that the same sections of members and detailing of joints are used. Tabulated figures of recommended sizes of purlins for various purlin spacings and truss spacings are given. Construction notes include recommendations on the grade of timber to be used and on joint construction.

3221. MOSS, D. H. **Industrial trusses.** *Quart. Rev. Timb. Developm. Ass., Lond.* 2 (8), 1950 (26–7).

Discusses the factors considered in designing the T.D.A. industrial truss type A. [see preceding abstract] and describes the tests made at Princes Risborough on its strength properties.

3222. BOUGHTON, R. V. **The importance of struts [in house roofs].** *Ill. Carp. Build.* 99 (3778), 1950 (134). P.R.

3223. [HENDERSON, F. Y.] **Home-grown Poplar.** *J. Land Agents' Soc.* 49 (2), 1950 (47–8).

Discusses the suitability of Poplar for use in roofs and stud partitions and gives an account of a tiled, hipped roof framed in Poplar instead

of softwood, constructed at the Forest Products Research Laboratory, Princes Risborough.

3224. GRAINGER, H. W. **The craft of the carpenter and joiner: (9) Design and construction of doors. (10) Framed and panelled doors. (11) Stair building. (12) Stairs, quarter space and winders.** *Ill. Carp. Build.* 138 (3740; 3742; 3744; 3746), 1949 (552, 554; 630, 632; 710, 712; 790, 792, 794). P.R.

Cf. *For. Abstr.* 11 (No. 616).

3225. BOUGHTON, R. V. **Nailed joints.** *Ill. Carp. Build.* 139 (3782), 1950 (284). P.R.

Discusses the theory of nailing and gives permissible loads on wire and cut nails used in nailing:—(1) Redwood and similar softwoods; (2) Pitchpine and Douglas Fir; and (3) Oak and similar hardwoods. Gives illustrations of nailed joints, and a sample calculation for nailing necessary to support a given load.

3226. HENDERSON, H. L. **A potential market for forest plantation thinnings.** *J. For.* 48 (2), 1950 (92–5).

Describes an experiment in using Spruce thinnings for making log cabins, the methods of sawing, tongue-and-grooving, seasoning, and actual construction of cabins.

3227. **Sectional portable camp.** *Woodl Sect. Index Canad. Pulp Pap. Ass.* No. 1059 (*B*–3), 1949. pp. 3 + 9 photos, 4 dgms.

The Penobscot Purchasing Co. have developed a sectional type of portable woods camp building [illustrated by photographs and plans] for use on their operations. The entire building is in the first place constructed as though it were to be a permanent structure, the only exception being that roof rafters and studding are doubled at the points of eventual separation into sections. When it is desired to move the camp, the building is divided into sections by sawing through floor and floor joists, walls and roof, with an electric circular hand-saw. The sections are transported through the woods by tractor on a specially designed sledge and bolted together at the new site..

3228. BOSSAVY, J. L'électrification des maisons forestières par éolienne. **[The electrification of forest houses by wind power.]** *Rev. for. franç.* 1950 (2), (82–9). [F.]

Describes, and discusses the respective merits of two types of wind-driven generators, one with storage batteries and the other a turbine which can be used without storage batteries, to generate hydrogen by electrolysis of water, the hydrogen thus obtained being used in calm weather to drive a motor generator.

38.3. *Road and Bridge Construction*

3229. **[Road making in British Honduras.]** *Rep. For. Dep. Brit. Hond. 1948*, [1949?] [2].

A most instructive piece of road-making was done at South Stann Creek, where a mile of old truck-pass through hardwoods was cambered up by two passes of the one-way disk plough on either side, followed by two passes with a light roller. This type of treatment in the Pine forest is expected to permit the construction of 93 miles of forest road at a cost of only $70,000. The main expense will be the bridges, culverts and embankments. On the Mountain Pine Ridge, it was found possible to make a cleared fire trace 8 ft. wide, with 4 passes of the light Allis Chalmers grader at a cost of $10–20 per mile according to conditions. The grass has to be burned off first, otherwise it clogs the machine.

3230. SILVERSIDES, C. R. **Construction of temporary winter roads for wheeled traffic.** *Woodl. Res. Index Pulp Pap. Res. Inst. Can.* No. 74 (*B*–8–*b*), 1949. pp. 4.

Deals with the factors which affect the penetration of frost into soils, and the methods by which penetration can be promoted. The data are taken from an article by Hakkarainen written in Finnish. [Cf. *For. Abstr.* 11 (No. 1427).]

3231. KROTOV, V. R. Skreperȳ na stroitel'stve lesovoznȳkh dorog. **[Scrapers in the construction of forest roads.]** *Lesn. Prom.* 1949 (7), (7–9). [Russ.]

Describes, with diagrams, the construction and use in road-grading of the D–147 road-making scraper, drawn by the S–80 tractor and controlled by cables from the 2-drum winch of the latter. The scoop of the scraper holds 6–8 cu.m. of earth (200–250 cu.m./[8-hr?] shift when working trips of 600–800 m.), takes a cut *ca.* 2·5 m. wide and up to 30 cm. deep, and weighs 7,200 kg. It cannot be used on boggy or soft ground, and the road site must first be cleared of stumps, shrubs, etc., preferably with a bulldozer.

3232. STRASHINSKI, B. A. Strug dlya avtomobil'nykh dorog. **[A grader for [the maintenance of] forest roads.]** *Lesn. Prom.* 1949 (11), (11–12).

Describes, and illustrates with scale diagrams and a photograph, a simply constructed tractor-drawn timber road-grader for earth or snow roads, designed by the Roads Section of the Central Research Institute for Mechanization [TsNIIME]. The angle-iron blade, which can be set at various angles to the longitudinal axis of the grader, is brought into or out of action by a special windlass arrangement (operated by a man on the grader) which lowers or raises a pair of skids at the back of the implement. An experimental model has been tested with satisfactory results.

3233. BAZICHENKO, L. P. Zimni ukhod za dorogami. **[Winter maintenance of roads.]** *Lesn. Prom.* 1949 (11), (8–9). [Russ.]

Resistance to sliding, per metric ton of load, varies greatly on rutted ice roads, according to their condition, from 9–12 kg. under the best conditions to 50 kg. for medium conditions and over 100 kg. when fresh, loose snow has fallen. As regards wheeled motors it has been shown that from 45 km./hr. in snow 0·5 cm. deep, speed is reduced to 5–15 km. and chains are necessary in snow 10–20 cm. deep, and at snow depths exceeding 25 cm. it is impossible to make headway. It is important that iced ruts should be kept in perfect condition and snow cleared after the slightest fall. Some protection is afforded by shelterbelts or portable screens. Of the snow-clearing implements available, the author specially mentions motor and tractor scrapers which will clear snow 20–30 cm. deep and keep the rut in condition. Deeper snow must first be cleared by snow-ploughs. For snow-drifts and for disposing of the snow cleared by scrapers or snow-ploughs there are the PS and D–166 types of motor rotary implements, mounted on the chassis of ZIS–5 and YaAZ–200 lorries. The PS, with a 73-h.p. motor, picks up snow 0·8–1 m. deep in a strip 2·5 m. wide and throws it aside to a distance up to 30 m. at a rate of 800 cu.m./hr.

3234. SOBOLEV, I. N. Bor'ba s zanosami na lesovoznykh dorogakh. **[The control of snow-drifts on timber-extraction roads.]** *Lesn. Prom.* 1949 (11), (9). [Russ.]

Data from the Mitrofansk road in the Pechorles 'Trust' show that neglect of drift control was responsible for hold-ups exceeding ¼ of the total working days in the 1947–48 season, and observations on other roads emphasize the seriousness of the problem. Though the mechanization of snow-clearing operations is of the first importance, it is urged that control measures against drifting must start when roads are first projected and reconnoitred. Special attention must be given to prevailing winds, local weather records and natural protection. Open expanses, bogs etc. should be avoided, and where this is impossible, shelterbelts, portable screens, brush fences etc. should be provided. A drift-protection plan is given in a diagram showing the disposition of natural and artificial obstacles along a typical stretch of road, and the author recommends that such graphic plans be prepared as a matter of course wherever snow-drifting is a serious problem.

38.4. *Construction of Railways, Cableways, etc.*

3235. GRANIL'SHCHIKOV, P. A. Industrial'nŷ metod ukladki uzkokoleynŷkh lesovoznŷkh zheleznŷkh dorog. **[An industrial method of laying narrow-gauge track for forest railways.]** *Lesn. Prom.* 1949 (7), (9–11). [Russ.]

Outlines a plan for making up prefabricated sections of railway track, assembled complete with sleepers, in special mechanized workshops.

3236. KARAVAEV, V. I., and SLAVUTSKI, N. I. Uproshchennaya nadstroyka brevnotaski. **[Simplified framing for a log conveyor.]** *Lesn. Prom.* 1949 (9), (22). [Russ.]

Engineering details and drawings of an economical method of construction for the framing of a log conveyor.

38.5. *Construction of Hydraulic Works*

3237. IVANOV, V. I. Mekhanizatsiya meliorativnŷkh rabot i vyemki toplyaka. **[The mechanization of river improvement works and the lifting of sunken logs.]** *Lesn. Prom.* 1949 (7), (13–15). [Russ.]

A scoop, operated by a 2-drum electric winch and cable tackle, was tried with success for dredging and bank-repair work in a mountain stream, in cold weather and with high water, in October 1948. The equipment used and its arrangement are described and illustrated diagrammatically, with notes on the organization of the work. The method is recommended. Brief suggestions are made on types of scoop suitable for different types of work.

38.6 *Drainage*

3238. LUKKALA, O. J. Metsäojien kunnossapito. **[The maintenance of forest drainage ditches.]** *Commun. Inst. for. Fenn.* No. 36 (1), 1948 (1949). pp. 64. 23 refs. [Fi.g.]

There are some 100,000 km. of drainage ditches in Finnish forests, and at least 14,000 km. ought to be cleaned each year. This article reviews the present situation as a result of war-time neglect, outlines methods to be used, and estimates costs.

4. FOREST INJURIES AND PROTECTION

42. INJURIES FROM INORGANIC AGENCIES, EXCLUDING FIRE

3239. Špánović, T. Posavske šume i sušenje slavonskih hrastova. **[Forests of the Sava water system and drying up of the Slavonian Oaks.]** *Šum. List* 72 (8), 1948 (261–7). [Serb.]

Describes the tract and discusses the causes and course of the damage. The drying up started with the construction of protective banks and canals, and has affected chiefly middle-aged and older Oaks that are now protected from flooding, and pure rather than mixed (with Beech, Maple and Elm) stands, and its incidence is highest in low-lying places near protective banks, in areas under grazing, and in open, litter-deficient forest; it has also, in places, been hastened by heavy attacks of *Lymantria dispar*. Remedial measures on a large scale are outlined.

42.1 *Air Currents*

See also *For. Abstr.* 11 (No. 3360).

3240. Sigotský, F. Vetrová kalamita v Slovenskom Krušnohori. **[Gale damage in the Krušnohorie region of Slovakia.]** *Pol'ana* 3 (7/8), 1947 (153–5). [Slovak.]

42.2. *Temperature Influences*

See also *For. Abstr.* 11 (No. 3325).

3241. Glock, W. S., and Studhalter, R. A. **Natural frost as a tool in dating growth layers in the branches of trees.** *Abstr.* in *Journal of the Colorado-Wyoming Academy of Science, Boulder* 3 (5), 1948 (56). [Texas Technological College.] L.S.

Natural frost injury and recovery were found to be a common feature in trees in Texas, and have been used, along with meteorological records, vegetational records, and direct observations, to date accurately the affected growth layers. Multiple growth layers in the annual increments of years in which frost damage occurred were found to be highly typical of the climatic conditions under which the trees grow.

3242. Studhalter, R. A., and Glock, W. S. **Artificial frost as a tool in dating growth layers and seasonal growth in the branches of trees.** *Abstr.* in *Journal of the Colorado-Wyoming Academy of Science, Boulder* 3 (5), 1948 (56). L.S.

Frost injury induced by means of dry ice on branches which are left on the tree serves as a useful internal tag in the accurate dating of growth layers, in determining the rapidity of deposition of a growth layer and the beginning and end of a season's growth, in the intra-seasonal dating of different growth layers of a multiple annual increment, and in the study of the anatomy of frost injury and recovery.

3243. Ernstson, M., and Hadders, G. Skadegörelse å granplantor genom uttorkning under vårvintern 1947. **[Damage to Norway Spruce plants by drying out in the winter-spring period of 1947.]** *Svenska Skogsv-Fören. Tidskr.* 46 (5), 1948 (310–22). 9 refs. [Sw.]

It was discovered in March 1947 that much nursery stock at the Brunsberg station of the Swedish Forest Tree Breeding Association was showing signs of damage; Spruce plants in particular had turned reddish or brown, and only 1-year-old stock that had been covered by the scanty snow of that season, had remained entirely green. Except for some controls, the beds were immediately covered with straw. Investigations were made of the probable cause, the degree of damage, the plants' chances of recovery, and variations in resistance in the progenies of known mother trees.

Results indicate that the trouble was due to severe soil freezing combined with the inadequate snow cover, conditions which produced physiological drought. Where a straw cover was not provided, further damage occurred as a result of sunny weather while the soil was still frozen. Damage to terminal buds appeared to be direct frost damage. Terminals were much more frequently damaged than lateral buds. Plants with badly reddened or browned foliage, or damaged terminal buds (unless saleable for hedges, game cover etc.), should be discarded. The progeny studies revealed a statistically significant variation in resistance as between the progenies of different mother trees. Though there was in general a negative correlation between resistance and height growth, a few progenies scored high

marks for both, and opportunities exist for selection. It is probable that in passing from N. Scandinavia to Central Europe there is a variation—possibly continuous—from hardy but less rapidly growing to less hardy but faster growing types of Spruce. Crosses between such types should be made, when, if the progenies were raised in Norrland, selection could be made for hardiness combined with good growth.

3244. Ow, L. von. Über die Dürreempfindlichkeit der einzelnen Holzarten im Auwald. **[The susceptibility to drought of individual species in flood-plain woodland.]** *Allg. Forstzeitschr.* 3 (21), 1948 (219–21). [G.]

Among the effects of the dry summer of 1947, varying degrees of drought resistance within a single species were noted in Ash, Maple, Cherry, Birch, and in Poplars propagated from cuttings. In general, seedlings were more drought-resistant than cuttings. Root cuttings of *Alnus incana* were more drought-resistant than stem cuttings. The drought had severe effects on sites where the ground water had sunk from a clay and sand layer to a gravel layer. Species practically unaffected were:—Robinia, Oak, Bird Cherry [*Prunus padus*] and Elm. Moderately affected were:—Lime, Birch, Cherry and Beech. Most affected were:—Maple, Alder and Ash. Poplars and Willow showed degrees of drought resistance in the following order:—White Poplar [*Populus alba*], Grey Poplar [*P. canescens*], Black Poplar [*P. nigra*], Canadian Poplar (hybrids of *P. monilifera* and *P. nigra*), White Willow (*Salix alba*), Aspen [*P. tremula*] and *P. robusta*. Pine and Spruce were both considerably drought-resistant.

3245. [Day, W. R.] **The drought-crack of conifers.** *Rep. Imp. For. Inst., Oxf.1948–9*, 1950 (12–3).

Cracked specimens of Sitka Spruce from Radnor Forest in Wales were referred to the Institute for examination. Subsequent inquiry showed that this cracking had occurred over a very wide area in Wales and parts of Scotland. An examination of the anatomy of the affected trees showed that the cracking had occurred during the 1947 growing season, and drought was suggested as being the probable cause; subsequent investigation has confirmed this view. Sitka and Norway Spruce have been the most seriously affected by drought crack, but all the conifers commonly grown, except the Pines, have been affected in some degree. The same phenomenon has also been reported from Denmark on Spruce.

Drought crack results from the internal shrinkage or collapse of the wood, owing to water being withdrawn from the main stem during periods of drought. It has only been seen in trees of about 20 years of age. Younger trees affected by drought seem always to die back without the cracking of the main stem. Drought sufficiently severe to have these effects also causes a more or less pronounced zone of abnormal wood to appear in the main stem; the character of this zone is similar, whether the tree dies back or cracks without dying back.

The affected Spruces were distinguished by the low specific gravity of the wood produced and the marked absence of well thickened latewood. The tendency of Spruce to produce this light, consistently thin-walled wood has been noted previously in connexion with bark necrosis of conifers attributed to frost injury. It is suggested that wood of this type favours collapse within the main stem owing to the strains set up during dry periods.

All the cases of drought crack which have been examined in the field, have occurred on soils which are reasonably fertile, and so encourage good growth in the young tree, but which are shallow in so far as root development is concerned. Drought crack is in reality a secondary phenomenon which occurs, under appropriate climatic conditions and at an appropriate age, in trees growing where the rooting space is too limited considering the potential needs of the tree and the fluctuations in water and air capacity to which the rootable soil is subject as the type of season varies. Preliminary observations in the field seem to indicate clearly that partial death of the root system occurs consistently in connexion with drought crack, although in some cases probably only the finer roots are affected. [Cf. *For. Abstr.* 11 (No. 3360).]

42.5. *Chemical Influences. Nutrient Deficiencies*

3246. Duchaufour, P. Observations sur 'la faim d'azote' de l'épicéa. **[Notes on nitrogen-deficiency of Spruce.]** *Rev. for. franç.* 1950 (1), (1–4 + 1 photo). 1 ref. [F.]

It has been observed that, whereas Spruce [*Picea abies*] plantations can be successfully established on *Genista pilosa* or *Pteridium aquilinum* heaths, they suffer severe check or die-back on *Calluna* heath, where Pine does well. Investigation of several sites showed that the A_1 horizon of the *Calluna* sites had 9·6–13·4% organic-matter content and C/N ratios ranging from 18·3 to 21. The corresponding figures for *G. pilosa* sites were 6·9% and 13·2 and for *P. aquilinum* sites 7·8 and 12·7. It is concluded that the failure of Spruce on the *Calluna* sites is due to lack of available nitrogen in the A_1 horizon where the greater part of its shallow, spreading root system is situated. The tap roots of Pine, on the other hand, go down to the A_2C horizon, which is rich in mineral nutrients. It is also to be noted that Spruce is a very poor mycorrhiza-former. To establish Spruce on such sites, it is necessary to mix it with N-fixing species such as *Pinus pinaster*, Alders, Robinia, or even *Genista* or Gorse.

43. FOREST FIRES

3247. EISELIN, H. Über Waldbrände und deren Bekämpfung. **[Forest fires and their control [in the Ticino].]** *Schweiz. Z. Forstw.* 100 (12), 1949 (544–51). [G.f.]

3248. CROSBY, J. S. **Is fire prevention effective.** *Tech. Notes Lake St. For. Exp. Sta.* No. 328, 1950. pp. 2.

Fire records were obtained from all the national forests in the Lake States for the period 1936–48. The number of fires occurring each year was compared with the number to be expected under the prevailing weather conditions. During the first part of this period the actual number of fires was greater than the expected number. Since 1942, there has been a trend towards fewer fires than were expected. Since most forest fires in the Lake States are man-caused, it is concluded that people are becoming more careful with fire in the woods.

3249. WILKINS, A. H. **The 1947 forest fire disaster.** *Rep. Me. For. Comm. 1947–8*, 1949 (72–83).

An account of the great forest fire of Oct. 1947 in Maine.

3250. LUKE, R. H. **Forest fire control in New South Wales.** *Aust. For.* 13 (1), 1949 (15–21).

An account of the special hazards of the region and the organization of fire control measures.

3251. SHOOBRIDGE, D. W. **Fire control in the Australian Capital Territory.** *Aust. For.* 13 (1), 1949 (8–14).

An account of organization, methods, and equipment, for the prevention, detection, and suppression of forest fires.

3252. GILBERT, J. M. **Fire control in Tasmania.** *Aust. For.* 13 (1), 1949 (34–9).

Organization, methods, and equipment, for prevention, detection and suppression of forest fires.

3253. LAWRENCE, A. O. **A decade in decadent.** *Aust. For.* 13 (1), 1949 (50–2).

A short account of the reorganization of fire protection in Victoria since the disastrous fires of 1938–39, with particular emphasis on radio communication

43.0. *Predisposing Factors and Causes*

3254. CHANDLER, W. G., and WESTMORE, N. E. **Assessment of fire danger conditions.** *Aust. For.* 13 (1), 1949 (53–62).

At the Yallourn and Kiewa undertakings of the State Electricity Commission of Victoria, a simple system of fire-danger estimation is being used to assist the fire-protection staff in their assessment of fire-danger conditions in the surrounding forests. The fire-danger rating is arrived at by adding a burning index, based on weather conditions on the day, to a season index based on past weather history for the season. Under Victorian summer conditions, the major factor associated with the degree of fire danger is wind velocity, the other two taken into account for calculating the burning index being relative humidity and temperature. The formulae for calculating these indices are empirical and are based on a study of recorded weather conditions in relation to actual bush fires and controlled burning during the summer seasons from 1938 to 1949. This method of fire-danger rating has been used with satisfactory results over the past 2 seasons.

3255. LINDENMUTH, A. W. JR., and KEETCH, J. J. **A new measure of the severity of fire seasons.** *Fire Control Notes* 11 (1), 1950 (15–19).

Explains a new method, now under trial, for expressing the severity of fire seasons in terms of number of fires. The number-of-fires rating is computed from a weighted risk factor which is derived by relating the actual occurrence to the burning index measured at fire-danger stations.

3256. FONS, W. L., and COUNTRYMAN, C. M. **Effect of litter type upon fuel-moisture indicator stick values.** *Fire Control Notes* 11 (1), 1950 (20–1). 1 ref.

Eight common types of litter were used in this test:—*Pinus ponderosa* needles, *Quercus kelloggii* leaves, *Ceanothus velutinus* leaves, *Arctostaphylos* sp. leaves, *Abies concolor* needles, *Purshia tridentata* leaves, mixed conifer needles, and dried grass. No significant differences were observed in moisture content of fuel-moisture sticks exposed over the different types. It had previously been shown [cf. *For. Abstr.* 3 (p. 158)] that there is no difference in moisture content of sticks exposed 9 in. and 12 in. above Douglas Fir litter, bare ground and gravel. It is thus probable that the type of ground cover immediately under fuel-moisture sticks is relatively unimportant when the sticks are exposed 9 in. or more above the surface. Ground cover of some type of litter is advisable, however, to keep the sticks from being splashed with mud during heavy rain.

43.1. *Protective Measures (including controlled burning)*

See also *For. Abstr.* 11 (Nos. 2566–7, 2641–4, 2648–50, 2654, 3271–3).

3257. JAGERSCHMIDT *et al.* Les projets de reconstitution de la forêt landaise. **[Plans for the restoration of the Landes forests.]** *C.R. Acad. Agric. France* 36 (14), 1949 (599–605). [F.]

Discusses causes of the disastrous fire in the Landes Pine forests in 1949, and measures for restoration and future protection, among which are: (1) the creation of fire-breaks, (2) a return to the system of sheep-grazing and raising of crops in certain areas, (3) the creation of mixed forests of Pine and deciduous trees, and (4) inclusion of the forests in a system of crop rotation.

3258. SKUNCKE, F. Om behovet av anvisningar för hyggesbränning. **[On the need for regulations on the burning of felled areas.]** *Norrlands SkogsvFörb. Tidskr.* 1948 (2), (218–22). [Sw.]

Suggests 'ten commandments' on burning in extension of para. 41 of the Swedish fire law (SFS No. 522), giving a précis of the legal requirements and how burning should be organized and carried out.

3259. HOLT, L. **Slash burner.** *Woodl. Res. Index Pulp Pap. Res. Inst. Can.* No. 73 (*F–2*), 1949. pp. 2.

Describes the performance of the Primus Slash Burner No. 550 [cf. *For. Abstr.* 11 (Nos. 636–7)] manufactured by A/B B. A. Hjorth & Co., Stockholm, and distributed in Canada by Sandvik-Canadian Ltd., 426 McGill Street, Montreal. The torch at present costs about $100.00 in Canada.

The main argument, hitherto, against controlled burning, has been the fire risk involved. With this new burner it is possible to operate during periods of low fire hazard or none.

A similar slash burner, the Fedco Pneumatic Flame Thrower, manufactured by the Equipment Development Co., Inc., Walnut Creek, California, delivers unburnt oil through the flame, which sets the oil alight on reaching the material to be burnt, and thus makes burning possible in wet weather. The price of this flame thrower is $60.00.

43.3. *Fire Damage*

See *For. Abstr.* (Nos. 2811, 2847–9).

44. DAMAGE BY HARMFUL PLANTS. VIRUS DISEASES

3260. SCHREINER, E. J. **Can Black Walnut poison Pines?** *Shade Tree* 23 (1), 1950 ([2]).

Black Walnut trees have been reported to kill or severely stunt a number of plants, including tomatoes, potatoes, alfalfa, Rhododendron, Apples, Quince and some varieties of Cherry. Chemical studies have shown that such injury is probably due to a chemical substance, juglone, which is given off by the Walnut roots and is highly toxic to some

plants [cf. also *For. Abstr.* 10 (No. 2446)]. The Morris Arboretum, Pennsylvania, now reports a case of apparent killing of Pines by Black Walnut. Progenies of Scots, Norway, Austrian, Japanese Red and Japanese Black Pines, and hybrids between these parents, were planted in the spring of 1945 in a reasonably uniform grass field. The front of this plantation was set back 24 ft. from a row of 7 Black Walnut trees. In autumn 1948, after 4 growing seasons, survival was slightly over 90%, with most of the Pines growing normally. Heavy mortality, however, had occurred in a semicircle of radius at least 42 ft., in the neighbourhood of the larger Walnut trees (30–35 ft. high). The 20 or so living Pines within, and bordering, this semicircle, are far below average height and in noticeably poor condition. The smaller Walnuts do not show a definite 'killing zone' but they have apparently retarded the growth of adjacent Pines.

44.1. *Forest Weeds*

See also *For. Abstr.* 11 (Nos. 2566, 2695–6).

3261. SUTTON-NELTHORPE, O. **The eradication of bracken.** *Quart. J. For.* 44 (1), 1950 (18–20 + 2 photos).

The author describes a horsedrawn machine which has been designed to deal with bracken either on land to be planted or in young plantations. The prototype machine was constructed by a firm of agricultural-machinery distributors and repairers at Brigg, and protective patents are being taken out to cover the idea. It was devised for use between rows of seedlings planted where the stumps of the previous crop prevent the use of ordinary mechanical means of suppressing bracken. The bracken between the seedlings in the row is dealt with by men with scythes or cleaning hooks, and it is noticeable that the scythe leaves more bracken untouched than does the bruiser. On unplanted areas the machine can be used with a tractor and adapted to bruise a 7–8 ft. swathe instead of a 3-ft. one. Preliminary trials indicate that, with this machine, the same team of men can suppress the bracken 2½–3 times as quickly as with the scythe alone. Moreover the bruiser deals with all bracken that is above the ground whereas the scythe, on ordinary woodland ground, does not touch anything less than 4 in. high. A rough estimate is that, under the conditions at present prevailing in Lincolnshire, the cost of bruising an acre of newly planted seedlings plus hand cutting between them would amount to about 19*s.*, compared with 45*s.* for doing the whole operation with the scythe.

3262. BULL, H., and CAMPBELL, R. S. **Recent research in poisoning weed hardwoods.** *Proc. 2nd ann. Sth. Weed Conf.* 1949 (1–7). O.R.E.

Reviews results of recent research in poisoning southern hardwoods at the Southern Forest Experiment Station.

3263. VIDME, T. Kjemisk ugrastyning. [**Chemical weed control.**] *Tidsskr. Skogbr.* 56 (11/12), 1948 (287–96). 3 refs. [Nor.]

Briefly reviews the development of chemical weed control, emphasizing that applications in forestry are still in their infancy. Gives notes, chiefly from literature, on the most important chemicals so far used and their prospects, so far as known, as weedkillers in forest nurseries. Included in these notes are results from preliminary trials made by the author in 1948 on nursery beds of Aspen and Norway Spruce. None of the chemicals tried could be used without injury to Aspen. With Spruce the following results were obtained: (1) Crude $CaCN_2$ seriously injured 4-year-old stock, but may be worth further trial mixed into the seedbed 1–2 weeks before sowing. (2) A spray of dilute H_2SO_4 [concentration not given] also injured 4-year-old stock, but needs a further trial as a spray for seed beds before the tree seed germinates. (3) $FeSO_4$, formerly much used for agricultural weed control, did not appear to damage the Spruce plants and should be further tested for selective action against nursery weeds. (4) $CuSO_4$ at a concentration of 4–5% appears of possible use for weed control without damage to Spruce. (5) Mineral oil [exact type not specified], even at 200 l./dekare, caused no apparent injury to 1- to 4-year-old plants, and in view of the successful use of such oils elsewhere, they are among the most important for further testing. (6) Turpentine oil, according to preliminary results, seems likely to be of the same order of effectiveness against weeds and harmlessness towards Spruce, as mineral oils. (7) Nitrocresol and nitrophenol preparations killed young Spruce.

(8) 'Hormone' preparations: Both Weedone and Agroxone, used in concentrations high enough to kill dandelion, also killed young Spruce plants. With the pure Na salt of 2,4–D used at 100 g./dekare, there was no damage to the Spruce. It is thought, however, that the hormone preparations may be more useful for weed control on roadsides, ditch sides etc. than on the actual nursery beds. The author considers that the most important subjects for further nursery experiments are: (*a*) Mixing $CaCN_2$ into seedbeds 1–2 weeks before sowing. (*b*) Watering with $ZnSO_4$ solution just after sowing. (*c*) Spraying with H_2SO_4 before germination. (*d*) Spraying with $FeSO_4$,$CuSO_4$, various mineral oils, and turpentine oils, in beds of different ages.

3264. RENNERFELT, E., and FRANSSON, P. Bekämpning av björksly med fenoxyättiksyrederivat. [**Control of Birch coppice with phenoxyacetic-acid derivatives.**] *Skogen* 36 (13/14), 1949 (177). [Sw.] [Statens Skogsforskningsinstitut.]

Tabulates preliminary results of some trials in Uppland with sprays of Agroxone [cf. *For. Abstr.* 10 (No. 2228)], Weedone (active constituent 2,4–D (10%), and Weed No More (active constituent 2,4–D (32%)), all as aqueous solutions in which the concentration of the active constituents was varied between 0·05 and 0·6% applied in May, June, and August, 1947, and June, 1948. Inspection in June, 1949, showed that for a good kill the leaves should be fully expanded at the time of spraying. When this stage had been reached, spraying continued to be effective until early August, but was ineffective later in that month. An effective concentration for all 3 preparations was 1–2% of the active constituent. Further experiments are in progress in Norrbotten, Öland and Bohuslän to test the effects of such substances on various forest weeds and undesirable trees.

3265. WIBLE, R. C. **Report into use of ammate in our Eastern Region, No. 1.** *Pa. For. Wat.* 1 (8), 1949 (181, 188). 5 refs.

Experiments were made in 1947 in Wyoming Forest District to test the possibilities of destroying hardwood scrub by spraying. The materials used were ammate, 2,4–D, fuel oil, kerosene and cattle salt. The last four substances produced temporary injury to plants, but little effect was apparent after one growing season. Ammate was more effective; it was sprayed on sample plots in 3 mixtures, viz. ½ lb./gal. water, 1 lb./gal., and 2 lb./gal. The spraying was done in August using a standard 5-gal. back-pack pump. It appears that the 2-lb. (or possibly 1½-lb.) solution is more practical and economical than the weaker solutions. The most resistant species were Red Maple, Oaks and bracken, Sassafras, Chestnut, Aspen, Grey Birch and Huckleberry. Bracken was the most difficult species to kill. The kill of all species on plots of scrub Oak or mixed Oak type was 30–80%. The relative costs of treatment by axe, bulldozer, and ammate spray (1 lb. concentrate and 2 lb. concentrate per 8 × 100 ft.), were $1.25, $1.44, $0.69 and $1.19 respectively. It is pointed out that cutting results in re-sprouting.

3266. MINSHALL, W. H. **Eradication of Poison Ivy (*Rhus radicans* L.). IV. Experiments with ammonium sulfamate and sodium chlorate.** *Sci. Agric.* 29 (12), 1949 (584–94). 16 refs. [Science Service, Ottawa, Canada.] O.R.E.

3267. DAVIDSON, J. H. (to Dow Chemical Co., Midland, Mich.). **Herbicides.** *U.S. Patent* No. 2,435,204, Feb. 3, 1948. *Biol. Abstr.* 23 (5), 1949 (16644).

Ethylene bromide is used alone or in mixtures to kill trees and shrubs. Wild Cherry, Sumac and Sassafras trees with stem diameters of 0·5–1·5, 1–2·5, and 3–6 in., respectively, were killed by autumn treatments at the base of the tree, 25 ml./plant giving complete kills. 1 part ethylene dichloride in 4 parts β,β-dichlorodiethyl ether in 25–100 ml. doses also killed the above trees.

3268. OFFORD, H. R. **Operation gooseberry.** *Amer. Forests* 56 (1), 1950 (21, 36–7).

An experiment was made in June 1948 in California to test the efficacy of 2,4-D, sprayed from a helicopter, to kill *Ribes* in an area of brush, stumps, scattered Pine, Fir, and Oak, overrun with Ribes [cf. *For. Abstr.* 11 (No. 1448)]. The task of digging out the *Ribes* on the test area of 40 acres would take 160 man-days. It was found that the helicopter could spray an acre of brush and *Ribes* in 30 sec. of actual flying time. Observations on the plots 6 weeks after spraying showed that 16 oz. or more of 2,4-D per acre caused significant damage to *Ribes* and other susceptible broad-leaved plants, and only minor injury to the

conifers. On steep or rocky ground, aircraft should, whenever possible, apply sprays from two opposite directions, so as to avoid leaving untreated spots in the shelter of tall trees, dense brush, rocks and stumps. Five gallons of spray solution per acre appeared to be enough to ensure uniform wetting of *Ribes* and brush of comparable size. The flights demonstrated that the 178-h.p. helicopter could fly within 30 ft. of the ground and spray a 30-ft. swath of *Ribes* at elevations of 5,000–6,000 ft. in rugged country, but lacked power to hover or fly slowly during spraying. When it was necessary to fly more than 30 ft. above the ground there was a noticeable loss of the rotor down-wash that plays an important part in driving the spray throughout the vegetation.

3269. PRIDHAM, A. M. S. **Delayed action of 2,4-D on trees, shrubs and perennials.** *Proceedings of the American Society for Horticultural Science, E. Lansing* 50, 1947 (395–7). 8 refs. E.M.B.

Describes briefly the delayed, localized effects of spraying with 2,4-D on a number of woody species.

3270. ELIASON, E. J. **The control of weeds in forest tree nurseries with oil sprays.** *Proc.* [*3rd ann.*] *Ntheast. Weed Control Conf. 1949* [1949] (178–9). 4 refs. O.R.E.

A review of progress to date. [Cf. *For. Abstr.* 11 (No. 1445).]

3271. NEUNS, A. G. **Chemicals for fire prevention.** *Fire Control Notes* 11 (1), 1950 (9–11).

Notes on effects, methods of application and costs of $NaClO_3$, polybor-chlorate, As_2O_3, R.C.A. (razorite concentrate anhydrous—a boron ore in granular form) and Borascu (similar to R.C.A.), for keeping fire lines clear of vegetation.

3272. **Chemical spraying cuts brush fire hazard.** *Timberman* 51 (4), 1950 (38–9, 100).

Discusses chemicals used and methods of spraying to eliminate or reduce vegetation growing round buildings in mills or camps, in air-seasoning yards, or along railway tracks, and estimates the cost in comparison with hand labour.

3273. BEATTY, R. H. **Controlling brush on utility right of ways.** *Proc.* [*3rd ann.*] *Ntheast. Weed Control Conf. 1949* [1949] (186–92). 14 refs. O.R.E.

A progress report with references to literature.

3274. WILLIAMS, J. R. **The introduction of *Physonota alutacea* Boheman (Col., Cassid.) into Mauritius.** *Bull. ent. Res.* 40 (4), 1950 (479–80). 6 refs. [Department of Agriculture, Mauritius.]

Physonota alutacea was introduced into Mauritius as a possible controlling agent for *Cordia macrostachya* [cf. *For. Abstr.* 10 (No. 2233)]. No normal development of the insect was possible in the field, however, because of the consistent destruction of the young larvae by predators, chief of which was the Black Ant (*Technomyrmex detorquens*).

3275. BOOTH, W. E. **The effect of grass competition on the growth and reproduction of Big Sage-brush, *Artemisia tridentata* Nutt.** *Proceedings of the Montana Academy of Sciences* 7/8, [1948?] (23–5).

Data obtained in this study indicate the inability of *A. tridentata* to compete with ungrazed, or lightly grazed, grass in South-central Montana.

44.2. *Parasitic Higher Plants*

3276. **Mistletoe control.** *Rep. For. Timb. Bur. Aust. 1948*, 1949 (15).

Various chemicals were injected into Eucalypts to discover their effect on parasitic Mistletoe. $CuSO_4$ has some effect, but dosage is still uncertain.

44.3. *Fungi*

3277. **[Fungicide nomenclature.]** *Phytopathology* 40 (1), 1950 (118).

The Subcommittee on Fungicide Nomenclature of the American Phytopathological Society, cooperating with the Interdepartmental Committee on Pest Control, has selected common names for 5 commercially available fungicidal chemicals which are useful for the control of various destructive plant diseases. They are as follows:—*ferbam* for ferric dimethyl dithiocarbamate($FeC_9H_{16}N_3S_6$); *ziram* for zinc dimethyl dithiocarbamate ($ZnC_6H_{12}N_2S_4$); *nabam* for disodium ethylene

bis-dithiocarbamate ($Na_2C_4H_6N_2S_4$); *zineb* for zinc ethylene bisdithiocarbamate($ZnC_4H_6N_2S_4$); and *thiram* tetramethylthiuram disulphide ($C_6G_{12}H_2S_4$).

3278. Škorić, V. Ključ za određivanje bolesti drveća. **[Key for the determination of tree diseases.]** Tipografija D.D., Zagreb. 1946. *Repr.* from '*Šumarski Priručnik*'. pp. 841–53. [Croat.] P.R.

Gives for each of the main Jugoslavian tree species or species-groups (alphabetically arranged; conifers and hardwoods separately) a key to its fungus diseases according to symptoms.

3279. Robak, H. **A heterosporous *Diplodia* sp. isolated from necrotic bark tissue of conifers in Western Norway.** *Svensk bot. Tidskr.* 43 (2/3), 1949 (534–9). 7 refs. [E.] O.B.D.

Describes *Diplodia diversispora* sp. nov. isolated from *Picea abies* suffering from die-back, and from dead branches of otherwise healthy *Abies grandis*. Its occurrence on Spruce was entirely saprophytic, but the position is less clear with regard to the Fir.

3280. Hahn, G. G. **Junipers previously reported blight resistant now proved susceptible to *Phomopsis juniperovora*.** *Plant Dis. Reptr.* 33 (8), 1949 (328–30). 5 refs. A.P.B.

Reports inoculation tests on *Juniperus virginiana* var. *hilli* and two specimens of *J. virginiana* previously reported to show resistance to Cedar blight. All three proved susceptible under experimental conditions. [Cf. *For. Abstr.* 9 (No. 1271).]

3281. [Day, W. R.] **The fungus flora of Spruce stems.** *Rep. Imp. For. Inst., Oxf. 1948–9*, 1950 (14).

Borings taken in the main stems of living and outwardly uninjured Sitka Spruce showed that they were colonized by various species of fungi. These trees varied from *ca.* 6 to 9 in. in diameter and were being investigated for root disease. Borings taken in Sitka Spruce of this size elsewhere did not show any fungus flora. This colonization seems to have been made possible by debility caused by root disease. Borings made in stems of Norway Spruce affected by bark necrosis showed that they were all colonized by fungi, not all of which were likely to be active in the rotting of wood. The same results were obtained from wood of drought-cracked Spruce. The discovery that Spruce may bear a fungus flora in their wood, even when they appear to be healthy as judged by the appearance of the crown, is a matter of considerable importance in view of the extensive use of Spruces in afforestation in Great Britain.

3282. Wagener, W. W., Childs, T. W., and Kimmey, J. W. **Notes on some foliage diseases of forest trees on the Pacific slope.** *Plant Dis. Reptr.* 33 (4), 1949 (195–7). A.P.B.

Elytroderma deformans on *Pinus ponderosa*, *Rhabdocline pseudotsugae* on *Pseudotsuga taxifolia*, *Hypodermella abietis-concoloris* on *Abies concolor*, an unidentified disease of *Acer macrophyllum*, and a disease of *Arbutus menziesii* thought to be caused by *Cryptostictis arbuti* and *Didymosporium arbuticola*.

3283. Luttrell, E. S. ***Scirrhia acicola*, *Phaeocryptopus pinastri* and *Lophodermium pinastri* associated with the decline of Ponderosa Pine in Missouri.** *Plant Dis. Reptr.* 33 (10), 1949 (397–401). 8 refs. [University of Missouri, Columbia.] A.P.B.

Brown - spot disease (*Scirrhia acicola*), hitherto considered to be dangerous only to seedlings of Southern Pine, was found responsible for a serious decline of 12- to 14-year-old *Pinus ponderosa* in Missouri. Neighbouring stands of *P. echinata* and *P. rigida*, on which brown-spot disease is known to occur, were, in this case, uninfected. This may be due to a greater inherent susceptibility in *P. ponderosa* or to the fact that the stand was weakened by growing on an unfavourable site, outside its natural range. *Phaeocryptopus pinastri* and *Lophodermium pinastri* were found in association with *S. acicola*. [Cf. *For. Abstr.* 6 (191).]

3284. Gill, L. S., and Andrews, S. R. **Note on a *Scopularia* attacking Western White Pine.** *Plant Dis. Reptr.* 33 (5), 1949 (227). A.P.B.

A species of *Scopularia* resembling *S. serpens*, and parasitic on bark as well as wood, was isolated from stems and roots of both diseased and apparently healthy trees of *Pinus monticola*, at several widely scattered points

throughout its range. Inoculation experiments produced bark lesions and often blue stain in the underlying wood.

3285. GOGGANS, J. F. ***Cronartium fusiforme* on Slash and Loblolly Pine in the Piedmont Region of Alabama.** *J. For.* 47 (12), 1949 (978–80). 6 refs. [Alabama Agricultural Experiment Station.]

In experiments by standard *t*-tests, no significant differences were found between the incidence of *Cronartium* (1) on Slash Pine in pure plantations and on Loblolly Pine in pure plantations, and (2) on Loblolly Pine in pure plantations and Loblolly Pine in mixed plantations. The incidence of *Cronartium* on Slash Pine in mixed plantations was low, and there was therefore a highly significant difference between Slash Pine in mixed and in pure plantations. Total infection (that on both species) in the mixed plantations was lower than that in pure plantations of either species. Multiple regression was used to find some factors that were correlated with the incidence of *Cronartium*. Age, height, and number of trees per plot were used as variables, but age was the only variable found to be significantly correlated with the % of *Cronartium*. All types of infection on Slash Pine in pure plantations were found to decrease with age. Branch and stem-and-branch infection on Loblolly Pine decreased with age, whereas stem infection increased with age.

A new method of *Cronartium* control is suggested by the slower growth (and lower % of *Cronartium* infection) of Slash Pine when it is grown in alternate-row mixtures with Loblolly Pine in the Piedmont. [Cf. *For. Abstr.* 10 (No. 2241).] *From author's summary.*

3286. ARNAUD, G. Une nouvelle maladie des plantes horticoles. **[A new disease of horticultural plants.]** *C.R. Acad. Agric. France* 35 (12), 1949 (496–7). 6 refs. [F.] A.P.B.

Notes on *Cylindrocladium scoparium*, a fungus found in France, so far on *Hedera helix* only, but which is known to be dangerous to tree seedlings in frames. [Cf. *For. Abstr.* 5 (281).]

3287. BONGINI, V. Tumori della robinia e del pioppo. **[Tumours of Robinia and Poplar.]** *Ann. Sper. agr.* (*n.s.*). 3 (1), 1949 (xvi–xvii). [It.] C.G.B.

Fusarium pallens, *Trichothecium candidum* and *T. roseum* have been regularly isolated from tumours on Robinia and 'Canadian' Poplars in Cherasco, but it is believed that the causative organism is a bacterium and the fungi are secondary.

3288. SCOTT, W. W., and SPROSTON, T., JR. **A *Valsa* associated with the decay and discoloration following the tapping of Sugar Maple trees.** *Abstr.* in *Phytopathology* 40 (1), 1950 (24–5).

3289. PLAKIDAS, A. G. **Scab of Chinese Holly (*Ilex cornuta*).** *Abstr.* in *Phytopathology* 40 (1), 1950 (22).

3290. JEHLE, R. A., and JENKINS, A. E. **Roadside survey for spot anthracnose of Flowering Dogwood in Maryland, Virginia, Delaware and West Virginia.** *Plant Dis. Reptr.* 33 (4), 1949 (198–201). 3 refs. A.P.B.

Presents new data on the distribution of *Elsinoë corni* on *Cornus florida*.

3291. BIRAGHI, A., and PAVARI, A. La difesa contro le malattie del castagno. **[Protection against the diseases of Chestnut.]** *Repr.* from *Atti del Convegno regionale del Castagno* 1948. pp. 23. [It.] X.

Reviews the spread of *Endothia parasitica*, *Phytophthora cambivora* and *Sphaerella maculiformis* in Italy and control measures taken or planned. [Cf. *For. Abstr.* 11 (Nos. 672, 674, 2614).]

3292. CUMMINS, G. B. **Oak wilt in Indiana.** *Plant Dis. Reptr.* 33 (8), 1949 (332). [Purdue University Agricultural Experiment Station, Lafayette.] A.P.B.

Reports the first appearance of *Chalara quercina* in Indiana.

3293. KUNTZ, J. E., and RIKER, A. J. **Root grafts as a possible means for local transmission of Oak wilt.** *Abstr.* in *Phytopathology* 40 (1), 1950 (16–7).

Abundant and wide-spread natural grafting of Black Oak [? *Q. ellipsoidalis*] roots in plots in Wisconsin was revealed by digging and washing out root-systems, and by the movement of poisons between trees, which was observed for a distance of up to 28 ft. Dyes and spores of the Oak-wilt fungus, *Chalara quercina*, also readily passed through such grafts. *C. quercina* was isolated on the symptomless side of root grafts

between wilted and apparently healthy trees. Bur Oak [*Q. macrocarpa*] roots were found to graft with one another but not with Black Oaks. Thus adjacent Oaks may have united root systems. Interruption of these systems on 6 plots in 1947 by poisoning adjacent healthy trees has, up to the present, given local control of the disease. [Cf. *For. Abstr.* 11 (No. 1467).]

3294. BONGINI, V. Seccore dell'ippocastano. **[Withering of Horse Chestnut.]** *Ann. Sper. agr.* (*n.s.*). 3 (1), 1949 (xvii). [It.] C.G.B.

Describes a premature leaf-fall of *Aesculus hippocastanum*, apparently caused by *Phyllosticta sphaeropsoidea*.

3295. LUTTRELL, E. S. **Horse Chestnut anthracnose in Missouri.** *Plant Dis. Reptr.* 33 (8), 1949 (324–7). 1 ref. [University of Missouri, Columbia.] A.P.B.

Anthracnose of Horse Chestnut (*Aesculus hippocastanum*) caused by *Glomerella cingulata* has been found in Missouri, where, in addition to leaf lesions, it causes die-back of the branches and severe cankers on branches and trunk. The progress of the disease on a Horse Chestnut in Missouri is described. Mild symptoms of the same disease also occurred on *A. octandra* growing near by. A *Fusarium* species was isolated along with *G. cingulata* from cankers high on the trunk and on the bases of large branches on *A. hippocastanum*. It is not clear whether this is merely a secondary saprophyte.

3296. ABRAHÃO, J. *Botrytis cinerea* Pers. parasitando mudas de *Eucalyptus* spp. [***B. cinerea* parasitic on seedlings of *Eucalyptus* spp.**] *Biologico* 14 (7), 1948 (172). [Port.] C.G.B.

The attacks were discovered for the first time in the State of São Paulo in September 1947 at the Instituto Biológico [cf. *For. Abstr.* 10 (No. 711)]. A preliminary experiment in artificial inoculation showed that the most developed plants offered the greatest resistance to infection.

3297. COE, D. M., and WAGENER, W. W. **Ash anthracnose appears in California.** *Plant Dis. Reptr.* 33 (5), 1949 (232). A.P.B.

Anthracnose (*Gloeosporium aridum*) on *Fraxinus velutina* in the Central Valley region of California was so abundant and widespread in 1948, that it seems likely to recur with severity when spring conditions favour its development.

3298. CRANDALL, B. S. **An epidemic vascular wilt disease of Barillo, *Calophyllum brasiliense* var. *rekoi*, in El Salvador.** *Plant Dis. Reptr.* 33 (12), 1949 (463–5). [Centro Nacional de Agronomía, Santa Tecla.] A.P.B. See also *Carib. For.* 10 (4), 1949 (309–10). [E.Span.]

The disease is characterized, externally, by wilting of leaves on a branch or top, and, internally, by dark brown streaking in the vascular system of the, normally, light wood. An unidentified species of *Cephalosporium*, similar to *C. diospyri* [cf. *For. Abstr.* 8 (No. 1423)], was cultured from streaked portions of the trunk, and produced symptoms of the wilt disease in inoculated trees. No measures for combating the disease seem possible, except felling and burning of the stump etc. The species is being dropped from the reforestation programme.

3299. FELDMAN, A. W., CAROSELLI, N. E., and HOWARD, F. L. **Chemicals for Dutch Elm disease.** *Abstr.* in *Phytopathology* 40 (1), 1950 (8).

Chemicals selected after evaluation in laboratory and greenhouse were tested in 1948 and 1949 on more than 1,200 trees of *Ulmus americana* growing under natural conditions. Results were:—(1) Hydraulic soil impregnation with lime suppressed wilt symptoms for at least one month when soil pH was maintained at 7·0 or slightly above. (2) Low-magnesium lime gave better control than high. (3) Hydraulic soil impregnation with urea, salicylate, and azo dye, alone or combined, did not effectively suppress symptoms. These three chemicals, combined with low-magnesium lime, gave approximately 70 and 50% control on woodland and estate trees respectively. Season of application (fall, summer or spring) had no apparent influence on results. (4) Nutrient sprays, containing urea, KH_2PO_4 and sucrose, temporarily retarded wilt symptoms when applied at the onset of wilting. The addition of $NaNO_2$ or salicylate to the nutrient spray resulted in 40% control. (5) Better control was obtained when treatments were applied before rather than after inoculation. (6) Results from greenhouse Elm seedlings were comparable with those in woodland experiments. (7) Trunk injections of basic

chemicals ($NaHCO_3$, $KHCO_3$, $Ca(OH)_2$) gave good control; citrates of Mg, K, and Na, no control. (8) Trees succumbed more rapidly to trunk than to twig inoculation.

3300. DIMOND, A. E., PLUMB, G. H., STODDARD, E. M., and HORSFALL, J. G. **An evaluation of chemotherapy and vector control of insecticides for combating Dutch Elm disease.** *Bull. Conn. agric. Exp. Sta.* No. 531, 1949. pp. 69. 86 refs.

Studies were undertaken to isolate the toxin of *Ceratostomella ulmi* from metabolism solutions. Instead of one toxin, a series of phytotoxic fractions has been isolated. One of these is a polysaccharide or related, complex carbohydrate. Another is suspected to be gluconic acid, others have not yet been identified. Some of these cause wilting of the leaf and some cause necrosis when absorbed into Elm cuttings. The bearing of toxins from cultures *in vitro* upon pathogenesis is discussed, and the need for studies carried out *in vivo*, to distinguish real from apparent toxins and to aid in chemical identification of toxins, is urgent. Resistance to toxins is apparently not the basis of resistance to Dutch Elm disease in *Ulmus pumila* and the Buisman Elm. The principal toxins isolated in these studies severely affect the water economy of cuttings placed in them. *U. pumila* is shown to have greater resistance to physiological wilt than *U. americana*. Chemotherapeutic treatment with 8-quinolinol benzoate [cf. *For. Abstr.* 9 (No. 2561); 11 (No. 684)] and experiments in the control of scolytid vectors of the disease by DDT spray are described and discussed. [Cf. *For. Abstr.* 10 (Nos. 764, 1426); 11 (Nos. 686–9).] *From authors' summary.*

3301. DIETRICH, J. A. **Greenwich, Conn., controls Dutch Elm blight.** *American City, New York* 64 (7), 1949 (112–3). D.S.I.R.

Cf. *For. Abstr.* 11 (No. 688).

3302. RAMAKRISHNAN, T. S., and RAMAKRISHNAN, K. **Ergot on Bamboo.** *Curr. Sci.* 18 (9), 1949 (344–5). 1 ref. [Agricultural Research Institute, Coimbatore.] A.P.B.

Describes an ergot fungus found on the apices of vegetative shoots of *Bambusa* sp. near Gudalur (Nilgiris). It is thought to be a species of *Claviceps*, a genus which, up to the present, has been observed on flowers only. The nature of the conidia indicates that it is not *C. purpurea.*

44.4. *Virus Diseases*

3303. MILLER, J. H., and THOMPSON, G. E. **Witches'-broom of Japanese Walnut in Georgia.** *Plant Dis. Reptr.* 33 (12), 1949 (455 + 1 plate). 2 refs. A.P.B.

Describes briefly the occurrence of witches'-broom on *Juglans sieboldiana* in Georgia. [Cf. *For. Abstr.* 9 (No. 1287).]

3304. CIFERRI, R. **La escoba de bruja de algunos árboles de sombrio del cacao, (*Erythrina* y *Tabebuia*) en Venezuela. Una enfermedad de origen no criptogámico. [Witches' brooms on some Cacao shade trees (*Erythrina* and *Tabebuia*) in Venezuela. A disease of non-cryptogamic origin.]** *Rev. Fac. nac. Agron., Medellín* 10 (34), 1949 (143–7). [Span.]

Witches' brooms of *Erythrina*, a species widely used as a Cacao shade tree in Venezuela, have now spread over a considerable area of the Paria peninsula. The disease has only been noted on *E. micropteryx*, but *E. corallodendron* is also said to be susceptible, while *E. glauca* is considered immune. Witches' brooms of a slightly different nature have also been observed on *Tabebuia pentaphylla* and there may be some connexion between the two. Since bark canker of *Erythrina* is also widespread in the Paria peninsula, it seems advisable to avoid cultivating the tree in this region.

3305. POSNETTE, A. F., and PALMA, M. **Observations on Cacao on the Paria peninsula, Venezuela.** *Trop. Agriculture, Trin.* 21 (7), 1944 (130–2).

Includes descriptions of a virus disease, characterized by witches' brooms, prevalent on the shade tree, *Erythrina micropteryx* in the Paria peninsula, Venezuela. [Cf. preceding abstract.]

3306. BAKER, W. L. **Studies on the transmission of a virus causing phloem necrosis of American Elm, with notes on the biology of its insect vector.** *J. econ. Ent.* 42 (5), 1949 (729–32). 9 refs. [U.S.D.A. Bureau of Entomology and Plant Quarantine.]

Describes successful results of a series of tests, established in July 1947, to confirm the fact that phloem necrosis of *Ulmus americana*

is transmitted by the leafhopper, *Scaphoideus luteolus* [cf. *For. Abstr.* 10 (No. 2950]. It was also found that several days must elapse after insects feed on diseased foliage before they can transmit the virus. Information on the life history and habits of the leafhopper is presented.

3307. BRETZ, T. W. **Seed transmission of the Elm mosaic virus.** *Abstr.* in *Phytopathology* 40 (1), 1950 (3–4).

Hand-picked seed from mosaic-infected American Elm was sown in the greenhouse and the seedlings obtained were examined periodically for mosaic symptoms. Before sowing, the seed was divided into 2 lots, in one of which the fruit was left intact and in the other separated from the seed. Over a period of 3 months, *ca.* 3½% and 1% respectively of the seedlings developed characteristic mosaic symptoms. Another sowing, distinguishing normal and malformed fruit, showed no correlation between malformation of seed and mosaic symptoms in seedlings. When leaf tissue from seedlings having mosaic symptoms was grafted into healthy Elm seedlings, about 25% of the latter developed typical mosaic symptoms within 5 months.

45. DAMAGE BY ANIMALS

45.1. *Mammals*

See also *For. Abstr.* 11 (Nos. 2566, 2580, 3459).

3308. MITCHELL, G. E. **Wildlife-forest relationships in the Pacific Northwest Region.** *J. For.* 48 (1), 1950 (26–30).

Notes on damage to trees and regeneration by deer, elk, bears, porcupines, squirrels, beavers, rabbits and mice.

3309. JONES, J. C. **Squirrels can be pests.** *Pest Control* 17 (11), 1949 (8–10, 12, 14). D.S.I.R.

Notes on the damage done by grey, red and flying squirrels and by chipmunks in the U.S.A., and on control by trapping, the use of chemical repellents, proofing with netting or sheet metal, shooting, poisoning or gassing.

3310. STOECKELER, J. H. **Porcupine damage in a northern hardwood-Hemlock forest of northeastern Wisconsin.** *Tech. Notes Lake St. For. Exp. Sta.* No. 326, 1950. pp. 1.

3311. TASKER, J. B. **Pocket gopher control in forest plantations, [by poisoning].** *J. For.* 48 (2), 1950 (130–1).

3312. HOUGH, A. F. **Deer and rabbit browsing and available winter forage in Allegheny hardwood forests.** *J. Wildlife Mgmt.* 13 (1), 1949 (135–41). 12 refs. B.A.P.

Damage to the low cover of trees and shrubby browse, and consequent reduction in natural regeneration, was far more extensive from rabbits than from deer. Heavy rabbit browsing was found beneath densely stocked, second-growth forests on north-facing slopes and well forested valley bottoms, as well as in more open sites. In fenced plots rabbits were more discriminating than deer in choice of species, preferring Red Maple [*Acer rubrum*]. Beech and Sugar Maple were also staple food plants, but Hemlock was hardly touched. Deer browsed 29% of all Red Maple regeneration, and 29% of all Hemlock. They also browsed Black Cherry [*Prunus serotina*] (26%), Sugar Maple (20%) and Beech (13%). An increase in available browse can be expected to take place 5–10 years after protection from both deer and rabbit in well stocked, second-growth stands. Recovery in poorly forested stream valleys is, however, much slower.

3313. ADAMS, L. **The effects of deer on conifer reproduction in northwestern Montana.** *J. For.* 47 (11), 1949 (909–13). 9 refs.

The winter range of white-tailed deer (*Odocoileus virginianus*) on the Fisher River in Lincoln County, Montana, occurs in a timber stand which is at present dominated by *Pinus ponderosa*, the most valuable timber species in the area. There is evidence that the Pine is being rapidly replaced by *Pseudotsuga taxifolia*, which is locally an economically inferior species. A study of deer browsing showed that though reproduction of both species is browsed heavily, the deer markedly prefer the Pine: 28% of the Pines showed either past or recent damage, compared with 11% of Douglas Fir.

3314. MOORE, A. W. **Forest tree-seed-eaters and methods used to measure their populations in the Pacific Northwest Douglas Fir Region.** *For. Cl. Quart.* 23 (1), 1949/50 (7–11, 25).

Both natural and artificial forest regeneration in the Pacific Northwest are affected by the presence of seed-eating animals, which are particularly harmful in the Douglas-Fir belt. These include white-footed mice (*Peromyscus maniculatus*), shrews (*Sorex* sp.), chipmunks (*Eutamias townsendi*) and tree squirrels (*Sciurus* sp.). The bulk of the conifer seed falls or is sown during the autumn and winter months at a time when the summer visiting birds have migrated south, so that birds play only a minor rôle in seed destruction. The commonest method of measuring the rodent population is trapping, but this is relatively slow and the take varies greatly with the human factor. A faster and equally indicative method has now been developed, known as the acceptance spot method. Acceptance spots consist of about 50 kernels of oats, Douglas Fir seed, or barley, placed on a foot-scuffed area. Douglas Fir seed is the best bait, as it is easier to interpret the hulling done by different animals on this seed. The seed should be scattered in a strip several inches long, and about half of the seed should be covered with a chip, piece of bark, or flat stone. The lines of spots should sample representative types of ground cover and topography. Several lines of 50 spots or more in different parts of the area studied are better than a long single line. At present the recommendation is 10 spots for every 40 acres. The object is to obtain the % of spots showing mouse or shrew acceptance (chipmunks are seldom interested in single seeds). Methods of distinguishing the visits of different species are described. The acceptance-spot reading for one night is about equal to the take from traps for 3 nights. Readings vary from 0 to 90%. At present it is assumed that mouse acceptance of 5% of the spots and less is an indication that broadcast sowing of Douglas Fir may be done with safety.

3315. Turček, F. O ochrane lesných semien pred drobnými hlodavcami. **[Protection of forest seeds against small rodents.]** *Pol'ana* 3 (7/8), 1947 (165–6). 5 refs. [Slovak.]

First results of the work of the State Forest Research Institute for Forest Protection are discussed. Various species of mice and voles do the most damage. Protective coating of seeds is not considered sufficiently effective, while the method of infecting bread with typhoid bacteria is expensive and does not affect all species of mice. The author *inter alia* recommends spring instead of autumn sowing (despite disadvantages in other respects) and keeping regeneration areas well cleared of shrub and weed growth likely to harbour mice. He warns foresters not to underestimate the damage caused by rodents and asks them to report cases of damage to Poplar, the bark of which gets badly eaten.

45.3. *Insects*

See also *For. Abstr.* 11 (Nos. 2603–9, 2635, 2703, 3300–1, 3306, 3442).

3316. Eidmann, H. A. Einschleppung und Einbürgerung. **[Introduction and naturalization.]** *Z. Weltforstwirt.* 13 (4/6), 1949 (67–70). [G.e.f.] [University of Göttingen.]

The factors (suitable climate, presence of food plants and absence of natural enemies) favourable to the establishment of forest insects accidentally introduced are discussed with examples. It should be possible from present knowledge of these factors to estimate the danger of introduced pests' establishing themselves and to combat them in the early stages.

3317. Dethier, V. G. **Chemical insect attractants and repellents.** Blakiston Co., Philadelphia. 1947. pp. 289. 690 refs.

A theoretical study which attempts to bridge the gap between chemoreception and the broader aspects of behaviour based on it. The lists of references appended to each chapter are comprehensive.

3318. Blunck, H. Aerosole als Schädlingsbekämpfungsmittel im Ausland. **[Aerosols as a pest control measure abroad.]** *Zeitschrift für Pflanzenkrankheiten (Pflanzenpathologie) und Pflanzenschutz, Bad Godesberg* 55 (5/6), 1948 (154–73). 47 refs. [G.]

A summary based mainly on literature from the U.S.A.

3319. Klimke, A., and Haury, H. Die Atemgiftwirkung neuer insektizider Mittel. **[The effect of new insecticides as respiratory poisons.]** *Anz. Schädlingsk.* 23 (2), 1950 (22–3). [G.]

Experiments indicated that 666 preparations can have a slight toxicity as respiratory poisons in addition to their normal effect as contact poisons.

3320. KRIJGSMAN, B. J., and BERGER, N. E. **A simple method for the estimation of contact insecticides.** *Bull. ent. Res.* 40 (3), 1949 (355–8). 8 refs.

The content of active substance in commercial preparations of contact insecticides can be estimated by testing them against the grain weevil (*Calandra granaria*) in Petri dishes and calculating the % of mortality. The method is most satisfactory for comparing different preparations of the same insecticide, but it can also be used for comparing different insecticides.

3321. RANGANATHAN, S. K., KOSHI, T., and SITARAMAN, N. L. **Methyl anthraquinone (tectoquinone)—a synergist for 2, 2-*bis* (*p*-chlorophenyl)—1, 1, 1-trichloroethane (D.D.T.).** *Nature, Lond.* 164 (4182), 1949 (1095). 3 refs. [Technical Development, Establishment Laboratory, (Stores), Kanpur.]

Recent investigations have shown that it is possible to increase the potency of glass plates treated with DDT by storing them previously in a box made of Burma Teak (*Tectona grandis*). As a first step in understanding this activation, the synergistic property, if any, possessed by β-methyl anthraquinone, a constituent of Teak, was studied. Experiments showed that β-methyl anthraquinone used alone against *Culex fatigans* did not kill but that the addition of 5% by weight to DDT produced a striking increase over the kill of DDT alone. Experiments on the persistence of residual films on glass against the same test insect, showed that whereas with DDT (56 mg./sq. ft.) the mortality rate falls below 50% in about 3 days (10-min. contact period) an equivalent concentration of DDT containing 2% of β-methyl anthraquinone produces mortality greater than 50% for 14 days. This synergism has been traced in part to *p*-benzoquinone and benzil.

3322. HADAWAY, A. B., and BARLOW, F. **Further studies on the loss of insecticides by absorption into mud and vegetation.** *Bull. ent. Res.* 40 (3), 1949 (323–43). 8 refs.

In tests with mud blocks, it was found that the absorption of DDT in oil solutions was considerable, only 8–19% of the total dosage being recovered from the outer layer. Adsorption of insecticide from the oil to the mud occurred. Up to 77% of the insecticide applied as a wettable powder was recovered from the outer layer and toxicities were correspondingly high. Emulsions gave results intermediate between these two. Loss of DDT by penetration of the carrier oil through the leaf cuticle may occur when an oil solution is sprayed on vegetation. The extent of penetration varies with different plants. Small amounts of DDT seem to be transferred from the inside of treated leaves to other untreated parts of young coffee and Avocado pear. Deposits from emulsions remained toxic on leaves exposed to ordinary climatic conditions longer than those from oil solutions. Deposits from wettable powders were readily washed off by rain.

3323. GOODRUM, P., BALDWIN, W. P., and ALDRICH, J. W. **Effect of DDT on animal life of Bull's Island South Carolina.** *J. Wildlife Mgmt.* 13 (1), 1949 (1–10 + 1 plate). 3 refs. B.A.P.

A report on observations carried out in 1946 to determine the effects of aircraft spraying to control ticks. Over forest areas, 3 lb. of DDT per acre in solvents of xylol or Pine oil diluted with water, were used. Insects were greatly affected, the degree depending chiefly on the protection afforded by the forest canopy and understorey of shrubs. On 64 acres of sprayed forest there was a bird population of 98·5 pairs before, and 108·5 pairs after treatment. On 64 acres of unsprayed forest there were, at the same dates, 42 and 60 pairs respectively. The DDT had no apparent effect on nesting birds, and the differential increase in nesting was attributable to initial differences in nesting populations and to a differential in ecological requirements of late nesters. Amphibians were commonly killed but many remained unaffected. Reptiles and fish were affected to a lesser degree. No reaction was observed for fox squirrels and other mammals. *From authors' summary.*

3324. ROBBINS, C. S., and STEWART, R. E. **Effects of DDT on bird populations of scrub forest.** *J. Wildlife Mgmt.* 13 (1), 1949 (11–6). 5 refs. B.A.P.

Describes the effect of a 5 lb./acre application, where a large % of the spray was deposited at ground level. Of the 5 commonest species in the sprayed area, the Maryland yellow-throat, prairie warbler, and house wren were reduced by 80%, and the red-eyed towhee was apparently reduced by 35%. No appreciable change in the numbers of yellow-breasted chats was

noted. The total decrease for the 5 commonest species, which represented 77% of the original population, was 65%. *From authors' summary.*

3325. Smith, D. N. **Effects of frost on sprayed Douglas Fir seedlings.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 5 (6), 1949 (3).

A growth stimulation of Douglas Fir seedlings sprayed for the control of *Adelges cooleyi* was noted when nicotine sulphate and the wetting agent Tergitol No. 4 were applied together [cf. *For. Abstr.* 11 (No. 2311)]. Further studies show that treated seedlings, in addition to stimulated growth, display increased frost resistance.

3326. Kerr, T. W., Jr. **The Arborvitae weevil, *Phyllobius intrusus* Kono.** *Bull. R.I. agric. Exp. Sta.* No. 305, 1949. pp. 30. 22 refs.

Life history, habits, and control of a Japanese insect species now established on nursery stock in Rhode Island. The host plants of the adult include many species of *Thuja, Chamaecyparis* and *Juniperus*. The adults can be controlled by DDT and 666.

3327. Ulrich, A. Giftöl und -nebel gegen die Nonne. **[Poisonous oil sprays and mists against the nun moth.]** *Z. Weltforstwirt.* 13 (1/3), 1949 (20–7). [G.g.e.f.]

After the nun-moth epidemic in the Rhine/Main Valley, near Babenhausen, in 1947, the following control measures were taken in 1948: (1) spraying from aircraft with 1 kg. DDT dissolved in 35 kg. diesel oil per ha. Spraying of 500 ha. in the centre of the area late in May in good weather gave an average mortality of 97·6%; spraying 1,150 ha. on the outskirts of the area from June 3rd–10th in bad weather gave results varying from almost complete destruction on 900 ha., and 59% mortality on 150 ha. to no results at all on 100 ha. (probably the results of inadequate signals from the ground to the aircraft); (2) dusting from the ground with a 5% gammahexane preparation, which had no effect, and with 5% DDT which gave an average kill of 98%; (3) aerosol dispersion of a gammahexane preparation dissolved in a chlorine liquid at a pressure of 2–4 atmospheres. Doses of 2–4 kg. gammahexane per ha. gave an average kill of 91%. In the whole area, only 30 ha. showed damage by caterpillars in 1948, and in November only 80 ha. showed more than 500 eggs per tree. It was expected that the infestation would, in any case, disappear naturally by 1949, or 1950 at the latest. The following conclusions were drawn: (1) treatment should be carried out early in May; (2) spraying from planes is cheaper than dusting and gives equally good results in good weather; and (3) aerosol dispersion even in the early stages of technical development gives good results and is cheaper than dusting.

3328. Le bostryche. **[The bark beetle.]** *Rev. for. franç.* 1950 (2), (99–106). [F.]

A circular issued by the Administration des Eaux et Forêts on the appearance, habits, damage and control of *Ips typographus*.

3329. Thalenhorst, W. Die derzeitige Borkenkäfer-Katastrophe in Deutschland. Eine vorläufige Übersicht über das neuere Schrifttum. **[The present bark-beetle outbreak in Germany. A preliminary review of current literature.]** *Zeitschrift für Pflanzenkrankheiten (Pflanzenpathologie) und Pflanzenschutz, Bad Godesberg* 55 (9/10), 1948 (288–94). 51 refs. [G.] I.I.E.

3330. Baldwin, H. I. **Growth and weevil damage of Norway Spruce growing under Aspen.** *Fox For. Notes N.H. For. Dep.* No. 45, 1949. p. 1.

During a survey of White Pine weevil [*Pissodes strobi*] injury to plantations, it was noticed that in some cases Norway Spruce was more weevilled under an overstorey of Aspen than when growing in the open. A light hardwood cover has commonly been recommended as a protection against weevil attack. Measurements made on several sample plots in 11-year-old plantations showed that Spruce of Italian origin growing under Aspen considerably exceeded in total height that grown in the open in spite of being nearly 5 times as heavily weevilled. The 1949 shoot growth was slightly greater on weevilled trees, possibly because of heavier foliage and hence more stored food available for elongation. Spruce of Estonian origin growing under Aspen was, however, only lightly weevilled; average height growth during 1949 was the same in the open and under cover, weevilled trees making slightly better growth.

3331. **Yellow-headed Spruce sawfly.** *Rep. Me. For. Comm. 1947–8*, 1949 (95–8).

In 1947 a serious infestation of *Pikonema alaskensis* was discovered on the coast of Maine. Red Spruce on 300 acres was heavily defoliated, with an additional 1,200 areas lightly to moderately infested. This is the first record of this sawfly's causing defoliation and killing of stands of timber-sized Spruce. On one of the heavily defoliated areas, well over 75% of the Spruce has already been killed, including trees 40–50 ft. high. A co-operative aerial spraying programme was carried out in July, 1948, and good control was obtained on most of 700 acres sprayed with 1 lb. of DDT in one gal. of fuel oil per acre. Lower dosages reduced the infestation but still left a rather heavy population locally.

3332. WESTVELD, M. **A suggested method for rating the vulnerability of Spruce-Fir stands to budworm attack.** Ntheast. For. Exp. Sta. 1945. pp. 2 + 2 tbls.

Cf. *For. Abstr.* 11 (No. 705).

3333. DAVIAULT, L. Comportement de la tordeuse des bourgeons de l'épinette suivant la composition des peuplements. [**Behaviour of Spruce budworm according to stand composition.**] *For. et Conserv.* 2 (1), 1950 (395–8). 4 refs. [F.]

A short review of recent systems for classifying the budworm vulnerability of Balsam stands [cf. *For. Abstr.* 9 (No. 1297); 10 (Nos. 2272–3); 11 (No. 705).]

3334. FRANCKE-GROSMANN, H. Über ein Massenvorkommen von *Gilletteella*-Gallen an Sitkafichten (*Picea sitchensis* Carr.). [**An outbreak of *Gilletteella* galls on Sitka Spruce.**] *Anz. Schädlingsk.* 23 (1), 1950 (3–6). 11 refs. [G.]

Notes on the life history of *Gilletteella*, an outbreak of which has occurred on Sitka Spruce in the forest district of Trittau bei Reinbek (Hamburg region). [Cf. *For. Abstr.* 6 (49).]

3335. BUTCHER, J. W., and HODSON, A. C. **Biological and ecological studies on some Lepidopterous bud and shoot insects of Jack Pine (*Lepidoptera-Olethreutidae*).** *Canad. Ent.* 81 (7), 1949 (161–73). 8 refs. O.R.S.

The results of observations made in an experimental plantation at Cloquet, Minn. (1) *Eucosma sonomana.* The larvae bore into the pith of new growth in *Pinus banksiana* and girdle the shoot, so that it becomes yellow and brown and frequently breaks. The dead leader, however, is often supplanted by one of the upper laterals in the following year and the tree assumes a bushy appearance, symptomatic of persistant breakage of the terminal branches. Incubation of the eggs is thought to take 3–4 weeks. The pupae overwinter in the litter at the base of the tree. Maximum adult activity takes place in May. Only 1 species of parasite was recovered from pupae. In the 3 years covered by the experiments, all age classes in the Cloquet plantation showed an increase in the average number of attacks for each succeeding year and the older trees sustained more attacks per tree in all cases. The number of attacks per tree varied according to the source of the seed. (2) *Petrova albicapitana* larvae form pitch blisters at the base of new shoots where they pupate. They overwinter as larvae. In 1947 adults emerged early in June. Very little parasitization occurs. The injury to the terminal shoot often results in its falling over, but not always in its dying. (3) *Petrova pallipennis* mines the terminal buds and overwinters as a dormant larva in the large central bud. In 1948 pupation was complete by the first week of June, and adult activity was highest by the third week. This species is very susceptible to parasitization, 6 different species of hymenopterous parasite being recovered from pupae brought into the laboratory. Buds attacked fail to develop, and a crooked stem or 'stag head' results.

3336. AUGHANBAUGH, J. E. **The *Matsucoccus* scale in Pitch Pine plantations.** *Pa. For. Wat.* 1 (8), 1949 (182, 186).

Describes the scale insect *Matsucoccus galliolus*, its habits, and the symptoms and effects of its attack on *Pinus rigida*. Data are given from a permanent study plot established in 1931 in a 12-year-old plantation which had first been attacked in the previous year. In 1939, 3% of trees were dead, in 1940 5%, in 1942 16%, and in 1948 28%. Mean annual increment was 39·5 cu. ft./acre in 1931, 58·1 cu. ft. in 1937, 69·9 cu. ft. in 1942, and 57·4 cu. ft. in 1948. The fact that m.a.i. culminated in 1942 at the early age of 23 years, and since then has been falling off rapidly, indicates the seriously weakened condition of the trees. Stocking is now only 48% of the original planting and it is doubtful whether the survivors

will even attain timber size. [Cf. *For. Abstr.* 2 (p. 123).]

3337. [Chrystal, R. N.] **The Douglas Fir *Adelges*.** *Rep. Imp. For. Inst., Oxf. 1947–8*, 1949 (13–4).

Population studies have been made in individual trees. A whole tree was examined, needle by needle, to determine the position of the *sistens*. It was found that there was a distinct concentration in the inner parts of the lowest branches, the central core of the middle branches, and on a few upper shoots which had sufficiently dense foliage. The tree appeared to possess in itself the conditions which are found in plantations in the thicket stage. Observations on trees of varying densities of foliage suggested that conditions of light and shade might be a factor in determining the pattern of settlement of the *sistens* population. Light-meter readings taken on individual trees, on both open and closed foliage, showed that a distinction existed between the zones favoured by the *sistens* and those where the population was negligible.

3338. [Chrystal, R. N.] **Douglas Fir *Adelges*.** *Rep. Imp. For. Inst., Oxf. 1948–9*, 1950 (15–6).

Comparative studies were made in the pruned and unpruned strips of two young plantations of Douglas Fir in North Wales. The vigour and growth of the pruned areas continued to compare well with that of the unpruned, and the *Adelges* population in the pruned trees showed no tendency to build up its numbers in the higher levels of the foliage. An over-all comparison on the pruned and unpruned areas showed that the *sistens* population was nearly 3 times as dense on the unpruned trees.

3339. Olson, H. **Ants in their plants.** *Amer. Forests* 55 (12), 1949 (28–9).

A note on damage to Douglas Fir nursery stock in Oregon by carpenter ants (*Camponotus nitidiventris*), an aphis-keeping species. Examination of 197 trees on two random strips at St. Helen's Tree Farm, showed that ants and aphids were present on 70% of them. About 35% of the trees were seriously affected and 5% had been killed. It is believed that the main injury is caused, not by the aphids, which feed on the needles, but by the ants, which score the bark, possibly with the object of stimulating the flow of sap for their aphids. No control methods have been developed as yet.

3340. Schread, J. C., and Chapman, G. C. **Control of ants in turf and soil [by the use of Chlordane].** *Bull. Conn. agric. Exp. Sta.* No. 515, 1948. pp. 23. 7 refs.

3341. Zeck, E. H. **The Pine aphid (*Cinara thujafolia*).** *Agricultural Gazette of New South Wales, Sydney* 59 (8), 1948 (422, 426). L.S.

Short notes on the aphid and its control.

3342. Joly, R. Les bostryches des bois feuillus. **[Bark beetles of hardwoods [and their control].]** *Rev. Bois Appl.* 5 (2), 1950 (9–12). [F.]

3343. Neves, C. M. Baeta. Contribuição para a conhecimento da entomofauna florestal indigena. **[Contribution to a knowledge of the insect fauna of the [Portuguese] indigenous forests.]** *Publ. Serv. flor. aquic. Portugal* 10 (1), 1943 (235–61 + 24 photos + 1 map). [Port.e.]

Notes on observations made by the Entomological Section of the Forest Biology Laboratory during the years 1941–43. Attacks of *Ips sexdentatus*, *Lymantria dispar* and *Thaumetopoea pityocampa* are specially mentioned and mapped.

3344. **Tree borers.** *Agricultural Gazette of New South Wales, Sydney* 59 (7), 1948 (369–74, 390). L.S.

Brief notes on the following:—the Fig longicorn beetle (*Dihammus vastator*), the elephant beetle (*Orthorrhinus cylindrirostris*), the Fig twig-borer (*Hylesinus fici*), the auger beetle (*Bostrychopsis jesuita*), the Pine weevil (*Aesiotes leucurus*), the Cypress Pine buprestid beetle (*Diadoxus erythrurus* and *D. scalaris*), the kurrajong weevil (*Axionicus insignis*) and the fruit-tree moth borer (*Maroga unipunctata*), with recommendations for their control.

3345. Neves, C. M. Baeta, and Silva, F. Azevedo e. Nota sôbre a aplicação da luta biologica na 'Campanha da *Lymantria*'. **[Note on the use of biological control methods in the campaign against *Lymantria* [*dispar*].]** *Publ. Serv. flor. aquic. Portugal* 10 (1), 1943 (281–7). 14 refs. [Port.e.]

Gives a list of parasites and predators of *L. dispar* in Portugal, with notes on progress made in biological control of this pest.

3346 FRANSEN, J. J. Bastaardsatijnvlinder bestrijding met chemische middelen in proef en practijk. **[Experimental and practical control of the brown-tail moth [*Euproctis chrysorrhoea*] by chemical means.]** *Versl. landbouwk. Onderzoek.*, *'s-Grav.* No. 54.14, 1949. pp. 39. 11 refs. [Du.e.]

[Cf. *For. Abstr.* 9 (No. 598.] Laboratory experiments showed that: (1) larvae after hibernation are very susceptible to pyrethrum and DDT, effectively controlled by powders containing 666, only slightly susceptible to derris dusts and powders containing dinitro-*o*-cresol, and unaffected by mixtures containing $CaCN_2$ or paradichloro-benzene as contact poisons; (2) older larvae are less susceptible to commercial dusting powders, DDT being the most effective, followed by derris and pyrethrum powders; and (3) newly-hatched larvae are unaffected by a powder containing 20% of the stomach poison, $BaSiF_6$ but are very susceptible to small quantities of pyrethrum and derris (the only dusting powders tested). Data on minimum lethal doses are tabulated. The effect of temperature and rainfall on pyrethrum and derris powders was found to be slight. Field experiments were inconclusive, but gave good results for derris dusting mixtures and poor results for pyrethrum powders. $BaSiF_6$ and Na_2SiF_6 appeared to be more effective than laboratory experiments suggest.

3347. SMITH, C. C. **The cankerworms in New Brunswick and Nova Scotia.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 5 (5), 1949 (1).

Adequate control of cankerworms can be obtained by thoroughly spraying the foliage with 50% DDT wettable powder at 3 lb. ($1\frac{1}{2}$ lb. actual DDT) to 100 gal. of water.

3348. GALLEGO M., F.L. Estudios entomológicos. **[Entomological studies.]** *Rev. Fac. nac. Agron., Medellín* 10 (34), 1949 (121–34). [Span.]

Notes on the habits and life history of *Hemiceras cadmia* and *H. velva*, pests of Guamo, the Coffee shade tree (*Inga* sp.), and on *Turuptiana oblicua* and *Heilipus lauri*, pests of *Persea gratissima.*

3349. HEDLIN, A. F. **Caragana seed chalcid, *Bruchophagus* sp.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 5 (5) 1949 (3).

Activity of the adult chalcid was found to be very slight at 60° F. and increased with a rise in temperature to about 100° F., at which point maximum activity was observed. Increased light intensity had a similar, and increased humidity a reverse effect. The number of eggs deposited in a seed varied, but in most cases was limited to one per seed. Under field conditions, 50% of the eggs of a given population had hatched in 6 days, and 87% in 8 days. The parasitism % varied very much from area to area.

3350. SMITH, C. C. **A new pest of Elm in New Brunswick.** *Bi-m. Progr. Rep. For. Insect Invest. Dep. Agric. Can.* 5 (6), 1949 (1).

Larvae of *Galerucella xanthomelaena* were all killed by spraying with 50% wettable DDT powder at 10 lb. powder/100 gal. water with 1 pint of raw linseed oil as an adherent.

3351. SCHAERFFENBERG, B. Grossversuch zur Bekämpfung des Maikäferengerlings durch Sommerüberschwemmung. **[Large-scale experiment in the control of cockchafer larvae through summer flooding.]** *Zbl. GesGeb. Ent.* 2 (1), 1947 (51–3). 3 refs. [G.] I.I.E.

Larvae of *Melolontha melolontha* were successfully destroyed by flooding infested land for short periods in summer.

3352. CAIRASCHI, E. A., *et al.* Essais de lutte contre le hanneton commun *Melolontha* (*Melolontha* L.) dans la haute vallée de la Saône au printemps 1949. **[Experiments in the control of *Melolontha melolontha* in the upper valley of the Saône in spring 1949.]** *C.R. Acad. Agric. France* 35 (12), 1949 (537–41). [F.] A.P.B.

Three types of chemical were tested: (1) 666, (2) S.P.C., a 666 derivative [sulphide?] and (3) S.N.P. [parathion?]. The operation took place in three stages: (1) destruction of the first concentrations of beetles on preferred host trees, (2) general treatment of host plants and (3) aerial dusting of concentrations on the borders of deciduous forest. The operation was successful in killing large numbers of cockchafers. Some preliminary observations are recorded.

3353. BALLU, T. *et al.* La lutte contre les hannetons. **[Control of cockchafers.]** *C.R.*

Acad. Agric. France 35 (8), 1949 (331–5). 8 refs. [F.] A.P.B.

A preliminary and brief account of experiments in the control *Melolontha melolontha* by means of 666 dusts, applied both from the air and from the ground. The trials extended over a forest area of 1,000 ha. around Étrépagny (Eure).

3354. TROUVELOT, B. *et al.* L' 'opération hanneton' d'Étrépagny. [**'Operation Cockchafer' at Étrépagny.**] *C.R. Acad. Agric. France* 35 (12), 1949 (531–7). 3 refs. [F.] A.P.B.

Further notes on control of *Melolontha melolontha* at Étrépagny, with some preliminary results. Considerable success was obtained with 666 preparations during the flight season. It is pointed out, however, that the development and behaviour of adult cockchafers are closely related to climate, and, therefore, a specialized knowledge of local climatic and biological conditions are necessary for successful control.

3355. CAIRASCHI, E.-A. Essai de lutte contre les hannetons par pulvérisations faites d'avions avec des solutions de D.D.T., dans la région de Sarrebourg (Moselle). [**Experiments in the control of cockchafers by aerial spraying with DDT solutions, in the Sarrebourg area (Moselle).**] *C.R. Acad. Agric. France* 35 (12), 1949 (541–2). [F.] A.P.B.

Forty ha. of woodland were treated with an emulsion containing 15% DDT, by aerial spraying at a rate of 20 l. per ha. Preliminary results were encouraging.

45.4. *Other Animals*

3356. TARJAN, A. C. **Parathion therapy of meadow-nematode-infected Boxwoods.** *Abstr.* in *Phytopathology* 40 (1), 1950 (27).

Soil watering with solutions of parathion appears to give control of meadow nematodes attacking the roots of *Buxus sempervirens*. [Cf. *For. Abstr.* 10 (No. 1463).]

3357. LINDGREN, R. M., and HENRY, B. W. **Promising treatments for controlling root disease and weeds in a Southern Pine nursery.** *Plant Dis. Reptr.* 33 (5), 1949 (228–31). A.P.B.

Preliminary results from trials carried out in the W. W. Ashe Nursery near Brooklyn, Miss., in co-operation with the U.S. Forest Service. Sixteen soil treatments with *Pinus palustris* and *P. caribaea* were compared. Two fumigants, chloropicrin and ethylene dibromide, were outstandingly successful in controlling root disease. Formaldehyde and allyl alcohol ranked next in effectiveness. The failure of a number of strongly fungicidal materials suggests that nematodes were a contributing factor in the root disease. Allyl alcohol also helped to keep down weeds during the first 3 months, and appeared to have reduced early damping-off losses.

46. DAMAGE BY MAN

3358. CARLISLE, K. W. **Effects of mechanical logging on reproduction at Mace Bay.** *Pulp Paper Mag. Can.* 50 (13), 1949 (136, 138). [Iroquois Falls Division, Abitibi Power and Paper Co. Ltd.]

Yarding of bunched timber by cable skidding appeared to do no more damage to natural reproduction than yarding with horses.

47. INJURIES OF ALL KINDS TO INDIVIDUAL TREE SPECIES

3359. GYÖRFI, J. A vegyeskorú és elegyes állományok erdövédelmi jelentösége. [**The importance of mixed uneven-aged stands for forest protection.**] *Erdész. Kiséri.* 47, 1947 (87–132). [Hu.G.]

Discusses in general terms the advantages of mixed, uneven-aged stands, owing to their greater resistance to fire, disease, insect attack and windthrow.

3360. [DAY, W. R.] **Root disease and butt-rot of conifers.** *Rep. Imp. For. Inst., Oxf. 1948–9*, 1950 (11–2).

Investigation of two cases of serious, though restricted, dying of Sitka Spruce about 22 years old, in the Forest of Dean, revealed the presence of no fungus known to be parasitic on roots; but examination of root systems of still living trees showed that very extensive dying back of the root had occurred. Zones of abnormal tissue of the type already recorded, occurred in the still living parts of roots that had died back, suggesting that physical causes had probably been of importance as causes of

disease. Had such a fungus as *Fomes annosus* been present in the areas investigated, this local die-back of Sitka Spruce would no doubt have been taken to be an instance of severe fungus infection.

Another result of root disease arising from physical factors is susceptibility to windthrow. Examination of the root systems of a number of windthrown trees and observation of a number of localities where it occurs, provide a good deal of evidence that liability to windthrow depends largely on the shallowness of rooting over a subsoil which is markedly unfavourable for root growth. Such soils frequently permit a good rate of growth in young trees, and it may not be realized that there is, all the time, an inevitable source of root disease in the subsoil conditions. [Cf. *For. Abstr.* 10 (No. 765); 11 (No. 3245).]

3361. JACKSON, L. W. R., and ZAK, B. **Grafting methods used in studies of the littleleaf disease of Shortleaf Pine.** *J. For.* 47 (11), 1949 (904–8). 3 refs.

A pathogenic virus has been suggested as a possible cause of this disease. [Cf. *For. Abstr.* 11 (No. 1507).] Transmission experiments were therefore begun early in 1940, with emphasis placed upon grafting. Both the above-ground parts and the roots of Shortleaf Pines were successfully grafted, with seedlings, saplings, and adult trees serving as stocks. The bark-patch method proved highly successful and resulted in a high % of unions. The approach-grafting method, although not quite as successful as the first method, did, nevertheless, give a fair % of graft unions for both stems and roots. Thus far healthy trees have not developed symptoms of the disease. *From authors' summary.*

3362. FOWLER, M. E. **Airplane scouting for pole blight of Western White Pine [*Pinus monticola*].** *J. For.* 48 (1), 1950 (23).

Experimental flights made in Aug. 1949 showed that there is no difficulty in recognizing pole stands of White Pine, or in distinguishing between healthy ones and those affected with pole blight. It was also possible to distinguish stands attacked by pole blight and blister rust respectively. Visual reconnaissance was carried out at *ca.* 500 ft.

3363. BOOMSMA, C. D. **Deaths in *Pinus radiata* plantations in South Australia.** *Aust. For.* 13 (1), 1949 (40–9). 6 refs.

Deaths in patches have occurred over a grass area of 2,000 acres in stands 3–29 years of age. The site quality of affected areas is average or higher, and the deaths are most numerous on shallow, stony soils of small hillocks and knolls, while stands on adjacent valley bottoms with deep soils are unaffected. Affected trees are resin bleeders, and the number of bleeders is directly proportionate to the number of deaths. A secondary fungal infection of *Diplodia pinea* is found on affected trees. It is concluded that the combination of physical conditions of shallow soils where deaths are most frequent, and the severe droughts of 1944 and 1945 explain the origin of most of the abnormal symptoms.

3364. NASH, R. W. **Studies of Birch.** *Rep. Me. For. Comm. 1947–8*, 1949 (107–21).

Reviews the work of the Maine Forest Service in studying the die-back of White and Yellow Birch [cf. *For. Abstr.* 10 (Nos. 2300–1)]. Studies of tree growth point to a general decline in increment for all species during the early 30's, coinciding with a series of exceptionally dry summers and cold winters. Most hardwoods then showed some improvement, while softwoods declined still further; but this downward trend has continued in Birch. Outbreaks of defoliating insects, and over-maturity of Birch stands owing to inaccessibility and lack of markets, are other contributory causes which have produced an abundance of trees of low vigour. Secondary attack by the bronze Birch borer on already weakened trees is often fatal. Experiments in control of this insect are reported.

Experiments are being made in the artificial regeneration of Birch. In the spring of 1948 at Salem, 100 White Birch wildings 1–2 ft. high were dug with a shovel, placed in wet moss, and then planted out on 3 sites: (1) old field with full sunlight, (2) old field beneath Gray Birch giving partial shade, and (3) woodland with full shade. Foliage was partly stripped. Survival for the 3 sites was 76, 80, and 29% respectively. The principal cause of the heavy mortality in (3) was rabbit browsing 47%).

Studies indicate that low stumps (ground level to 1 ft.) from vigorous young trees cut in the spring, give the best sprout growth. A medium to high degree of sunlight is also favourable. Sprouts from large stumps died

after a few years. Heavy browsing by deer and rabbits was a general adverse factor.

Examination of cut-over areas shows that successful natural regeneration of Birch depends on complete exposure of the soil and a high degree of sunlight; this may indicate the desirability of summer and mechanical logging. Clear cutting is still the best known method of managing Birch stands. When other species are cut, Birch should not be left more than one or two years afterwards. Where partial cutting is desired by the owner, it seems, from present information, that the cut should not exceed 40%. In such cuttings, desirable Birches which are to remain should have other trees of about the same height left close to them to afford protection particularly on the south and west sides.

3365. GARREN, K. H. **Leader dieback—a 'new' disease of Sweetgum.** *Plant Dis. Reptr.* 33 (9), 1949 (351–3). 5 refs. [Alabama Polytechnic Institute, Auburn.] A.P.B.

A new and unidentified disease of *Liquidambar styraciflua*, characterized by die-back of the leader, has been observed in Georgia. The disease is most noticeable on younger trees, where necrosis proceeds downwards from the terminal region and involves the lower branches more or less in succession. The same kind of development usually occurs on older trees as well, but, on these, the die-back is also apt to appear in scattered groups of secondary branches. Various fungi have been isolated from diseased tissue, but none is yet definitely linked with the disease.

5. MENSURATION. INCREMENT. YIELD

3366. CHAPMAN, H. H. **Forest mensuration.** McGraw-Hill Book Co. Inc., New York. 1949. pp. xiv + 522. 592 refs. Price $5.00 (£2. 2*s*. 6*d*.).

Supersedes Chapman and Demerrit's 'Elements of Forest Mensuration'. It includes chapters on the following subjects: elements of forest mensuration; elementary computations; cord or stacked measure; cubic volume of logs; log scaling; construction of log rules; measurement of assortments (mining timbers, sleepers etc.); determination of volume of felled trees; construction of local volume tables; construction of standard volume tables; construction and application of taper tables; measurement of diameters of standing trees; measurement of height of standing trees; boundary survey and determination of total area; timber estimating for cubic and cord measure; timber estimating for bd. ft. by use of log rules; ditto by use of volume tables; measurement of assortments in the tree; fundamental statistical techniques; influences affecting the growth of trees; the age of trees and stands; the growth of trees and of stands; the growth of trees in total height based on age; the growth of trees in dimension and form; normal yield tables for even-aged stands and their construction; prediction of periodic annual growth by use of normal yield tables; periodic and current growth in diameter based on stand tables; predicting the periodic annual growth of stands by stand tables; growth %; sample plots; and the forest survey or inventory.

The large number of references are almost all to American literature.

52. MEASUREMENT OF TREES AND TIMBER

See also *For. Abstr.* 11 (Nos. 3398 et seq.)

52.3. *Form. Taper*

3367. PALLAY, N. Erfahrungen zur Feststellung des Durchmesserquotients, der Durchmesserverminderung und der Rindenangaben der aus Süd-Zala stammenden Kiefer. [**Experiments in the determination of form quotient, taper, and bark data for Pine growing in South Zala.**] *Erdész. Kiséri.* 47, 1947 (164–211). [Hu.g.]

The data are given in full in the German summary. The author also briefly discusses the edaphic and climatic factors of the site, which influence tree growth and form. The study is based on measurements of 65 trees.

3368. GIERUSZYŃSKI, T. O kształcie strzał drzew lesnych. [**Stem form of forest trees.**] *Sylwan* 92 (2/4), 1948 (204–47). [Pol.e.]

A new method for calculating the form factor (f) and form quotient (q) of forest trees is

discussed, in which only two sectional areas at 0·1 and 0·5 of the stem length are used.

The results are based on the measurement, under bark, of 60 stems of Norway Spruce, 80–90 years old and from a first-quality mountain site. It had previously been demonstrated [cf. following abstract] that stem volume may be calculated from the formula $v = l\ (0{\cdot}23\ g_{0{\cdot}1} + 0{\cdot}58\ g_{0{\cdot}5})$; from this it follows that $f_{0{\cdot}1} = 0{\cdot}58\ q^2 + 0{\cdot}23$.

In these formulae

$q = \sqrt{\frac{g_{0{\cdot}5}}{g_{0{\cdot}1}}}$ = form quotient

$f_{0{\cdot}1}$ = true form factor based on $g_{0{\cdot}1}$;

$g_{0{\cdot}1}$, $g_{0{\cdot}5}$ are sectional areas at points 1/10th and ½ respectively along the length of the stem from the base.

l = stem length.

This means that the form factor depends only on the form quotient (q). A table is given which shows the form factors ($f_{0{\cdot}1}$) for all values of q from 0·57 to 0·85 in 0·01 intervals of q. Therefore, when q has been determined, f can be obtained directly from this table. The variation co-efficient of form-factor estimates by this formula is 1·8%; this is the same as for volume estimates by the formula $v = l\ (0{\cdot}23\ g_{0{\cdot}1} + 0{\cdot}58\ g_{0{\cdot}5})$.

It is also possible to calculate Schiffel's form exponent (r) from the form quotient (q). (Schiffel assumes that the tree is a solid produced by the revolution about the x axis of a curve of the general formula $y^2 = px^r$.) Using the same two sectional areas $g_{0{\cdot}1}$ and $g_{0{\cdot}5}$ and the general equation, $g = a + bx + cx^2$ [cf. following abstract] the following final formula is derived:—

$$q = 1{\cdot}313\sqrt{\frac{10^r}{9^r(r+1)}} - 0{\cdot}23;$$

A table based on the above formula is given which shows the values of q for all values of r between 0 and 3·5 at 0·1 intervals of r. It is claimed that as regards both convenience and precision, the method of estimating r from q by means of the table, compares favourably with alternative methods of determining the value of r.

52.4. *Measurement of Volume*

3369. GIERUSZYŃSKI, T. Formułki miąższościowe dla drzew ściętych. [**Volumetric formulae for felled trees.**] *Sylwan* 92 (2/4), 1948 (190–203). [Pol.e.]

For certain purposes the existing formulae for calculating the volume of felled trees are not sufficiently accurate. Kunze, Gehrhardt and Tjurin have examined the magnitude of the errors that may be expected from the use of Huber's, Smalian's and the other commonly used formulae. These errors may be reduced by dividing the stem into very short sections, but this greatly increases the work of measuring.

A new formula is proposed which is based on the general equation $g = a + bx + cx^2 + \ldots$, where g is the basal area at a given point, x is the proportion of the stem length from the base to that point; and a, b and c are constants.

The author uses three sectional areas (g) at 1/10th, ½, and at the top of the stem. These three points are considered the most suitable for defining stem form. The sectional area at these points serve to calculate a, b, and c in the above formula.

After integration the equation becomes:—

v (vol.) $= l\ (0{\cdot}23\ g_{0{\cdot}1} + 0{\cdot}58\ g_{0{\cdot}5} + 0{\cdot}19\ g_n)$ (A)

and if $g_n = 0$

$v = l\ (0{\cdot}23\ g_{0{\cdot}1} + 0{\cdot}58\ g_{0{\cdot}5})$ (B)

The stem volumes calculated by formulae A and B were found to be almost identical with the volumes obtained by xylometric methods and by applying Huber's formula to 1-m. sections on each stem. The application of Huber's formula to the whole stem ($v = g_{0{\cdot}5}\ l$) gave significantly different volumes from the above.

The investigation is based on 60 stems of Norway Spruce, 80–90 years old and from a first-quality mountain site. Accepting as the true volumes those determined by applying Huber's formula to 1-m. sections, the variation co-efficients of the volume estimates were 0·9% for formula A, 1·8% for formula B and 3·4% for volumes calculated from the formula $v = g_{0{\cdot}5}\ l$.

3370. CZURAJ, M. Tabele powierzchni przekroju i miąższości drzew leżących. [**Tables of basal areas and of volumes of felled trees.**] *Wydaw. pomocn. tech.-gosp. Inst. Bad. Leśn.* No. 18, 1948. 121 pp. of tbls. [Pol.]

Gives for mid-diameters up to 100 cm., tables showing (1) basal areas of single stems by cm. and mm. classes; (2) total basal areas for multiples up to 100 stems per cm. class; (3) volumes (in round) of 2-m. sections by cm. and

mm. classes; (4) volumes (in round) of stems from 1 to 31 m. long by cm. classes.

3371. DELGADO, P. P. R. DA SILVA. **Um método rápido e exacto de cubar arvores abatidas.** [**A quick and exact method of determining the volume of felled trees.**] *Agros* 31 (4), 1948 (198–202). [Port.]

A mathematical study.

3372. **Official log scaling and grading rules for the Pacific Northwest. West Coast logs.** Columbia River Log Scaling and Grading Bureau, Portland. [*n.d.*] pp. 18. Price $1.00. P.R.

3373. GEVORKIANTZ, S. R. **Converting International ¼-inch gross sawlog scale to peeled total volume in cubic feet.** *Tech. Notes Lake St. For. Exp. Sta.* No. 329, 1950. pp. 1.

3374. CLEMENTS, V. A., STEVENS, C. W., and ROY, D. F. **Form-class volume tables for Sugar Pine** [*Pinus lambertiana*] **and Red Fir** [*Abies magnifica*] **in California.** *Res. Note Calif. For. Range Exp. Sta.* No. 61, 1949. pp. 137. 4 refs. [Cf. *For. Abstr.* 11 (No. 1515).]

3375. MONTEIRO, J. DA CUNHA. Eucaliptais—elementos para a determinação do rendimento. Método de avaliação rigorosa do volume do arvoredo. Organização de tabelas de ordenamento, baseadas nesse método. [**Eucalypts—principles for the calculation of yield. Method of making accurate estimations of tree volume. The production of volume tables based on this method.**] *Publ. Serv. flor. aquic. Portugal* 10 (1), 1943 (161–92). 15 refs. [Port.e.]

Describes methods used in estimating the volume of timber in a stand of *Eucalyptus globulus* in Portugal, and discusses the results. Volume table and curves are presented for 11-, 12-, 13-, 14- and 15-year age gradations with yield/m.a.i. curves and with comparisons of diameter distribution with the Gaussian distribution curve.

3376. STEVEN, H. M. **Census of timber (Scotland) 1941.** *Emp. For. Rev.* 25 (4), 1949 (367–8).

The census was made by the Timber Production Department as a basis for a rational system of allocation of timber. It had the following features:—(1) An estimate of the standing timber was made for every wood in Scotland of 5 acres and over, containing utilizable timber. (2) The map used was the 1-inch Ordnance Map, which combined the advantages of accuracy and coverage of a large area on each sheet. (3) The unique and necessary feature of this census was that it was kept continuously up to date by using the timber-licensing data. (4) The census unit was a wood, or part of a wood, containing utilizable timber of a similar type. (5) The average volume per tree was selected as the figure best calculated to convey information regarding utilization. It was coded as follows:—P.S. mainly round props, average volume/tree 3 cu.ft. and less. P.L.—partly pitwood and partly saw logs, average volume/tree 4–9 cu. ft.; S.S.—mainly sawlogs, average volume/tree 10–19 cu. ft.; S.L.—large sawlogs including sleepers, average volume/tree 20 cu. ft. and over. The presence of over 5% of the trees suitable for poles was coded, and quality of produce (1 good, 2 moderate, and 3 poor) was entered. The adequacy of the census volume figures was tested whenever the Department purchased stands and more detailed enumerations were made. While marked differences were sometimes noticed between census and purchase volumes, on the average, for the whole period that the system was in use, the difference was only 10%.

3377. FINNEY, D. J., and PALCA, H. **The elimination of bias due to edge-effects in forest sampling.** *Forestry* 23 (1), 1949 (31–47). 2 refs.

Cf. *For. Abstr.* 10 (Nos. 2313, 2999).

3378. LISSDANIELS, O. M. Kubikmassans uppskattning genom provytetaxering. [**The estimation of volume by sample-plot surveys.**] *Svenska SkogsvFören. Tidskr.* 46 (5), 1948 (323–30). 5 refs. [Sw.]

A tabular comparison is made of statistics for total volume and volume by diameter classes for 19 forests, varying from 120 to 1,300 ha. in area, as obtained from strip surveys and surveys using circular sample plots of 5 m. radius. The errors involved are discussed, with the conclusion that the sample-plot method—though it gives rather less precise data on volume distribution by diameter classes—is sufficiently accurate for practical purposes even in small forests, and has the advantage of requiring

fewer men for the work. This appraisal of the method is based on the following sampling conditions:—(1) The spacing between compass lines must be that found in Östlind's tables [cf. *For. Abstr.* 9 (No. 1935)]. (2) Sample plots of 5 m. radius are spaced 160, 180 or 200 m. apart for woods having areas of respectively 100–300, 300–500 or over 500 ha. (3) So far as possible, the spacing should result in the plots forming the corners of squares. In small forests the same effect can be got by increasing the distance between lines and simultaneously decreasing the plot spacing within the lines according to a given rule. (4) If trees over 29 cm. in d.b.h. are poorly represented, the plot radius, for this class alone, should be increased to 8 m. (5) Sample trees for height and form measurements are taken according to principles already laid down by the author [cf. *For. Abstr.* 9 (No. 1935)] for strip surveys. The intervals at which they are taken varies with the 3 categories of forest recognized in that paper. The following procedure is given for sample-tree measurements: First measure all trees of 8 cm. d.b.h. and over in a circle of 3 m. radius; in the ring, outside this circle, defined by an outer radius of 5 m., measure all trees of 17 cm. d.b.h. and over; finally in a ring outside this, with an outer radius of 8 m., measure all trees of 29 cm. d.b.h. and over.

3379. ALLOUARD, P. La reconnaissance méthodique des forêts tropicales par quadrillage. [**The methodical reconnaissance of tropical forests by the use of a decimal grid.**] *Bois For. Trop.* No. 11, 1949 (277–87 + 2 dgms.). [F.]

Describes a decimal grid system which has been used in Indo-China for the last six years for the standardization of forest mapping, enumeration, permanent record of data, and control of exploitation and regeneration. The main unit is the sector (*secteur*), 10,000 × 10,000 m. (38·6 sq. miles), which is given either a local name or a capital letter and is laid out on carefully oriented N.-S. lines. This is broken down into a hundred blocks (*blocs*), 1,000 × 1,000 m., numbered 0–99, each of which may be further divided into a hundred compartments (*parcelles*) of a hectare each, also numbered 0–99. The numbering starts in the N.W. corner of each major division and proceeds serially southwards down the west row of smaller units to No. 9, then southwards down the next row 10–19 and so on. The order of numbering should always be adhered to even if the forest does not cover the whole square. In this way the location of any unit in the grid will always be the same.

For very detailed work, compartments may sometimes be divided into a hundred units (*placeaux*), 10 × 10 m., and for less intensive work the blocks may be broken down into twenty-five plots ('*plots*'), 200 × 200 m., designated by small letters, omitting *w*, or into four squares (*carreaux*), 500 × 500 m., designated I to IV. To facilitate reopening any part of the grid or locating any unit, the corners of the blocks are marked by concrete pillars 70 × 20 cm. in section, with their sides oriented at 45° to the N.-S. line and facing towards the four blocks which meet at the point. Each face bears in raised figures the number of the block, which is also painted in coal-tar on the nearest tree. It is often thought worth while to mark the narrow traces cut for the main lines with half rings of tar at least 20 cm. wide, facing towards the lines, on a considerable number of trees. If the tar is carefully applied on smoothed but unwounded bark, it will last for at least twenty years in the tropics, and will be much easier to find than expensively cleared broad lines which become overgrown in a few months. The cost of laying out a grid (which is not stated) may not always be justified when operations are first started in a forest, but if a beginning is made on a standard system this can be extended progressively and the value of being able to build up and compare data obtained at different times from identifiable units will increase as time goes on. The author describes in detail the method of 100% enumeration and mapping in of valuable species by compartments.

53. SOLID CONTENTS OF STACKED MATERIALS

3380. BRABENDER, G. J. **Pulpwood measurement problems and methods.** *Tappi* 32 (8), 1949 (337–9). 6 refs. [Marathon Corporation, Rothschild, Wis.] L.S.

Approximately 50 cords of Ontario Black Spruce pulpwood were examined, the following measurements being made on each stick: (1) length of stick; (2) diameter at ends and centre; (3) density and (4) wet weight. The individual sticks, approximately 100 in. in length were

piled in a 1-cord rack, and the volume was taken by measuring the average height and width of both faces of the pile. The pile was dismantled, the sticks were cut to 50 in., the 50-in. sticks were repiled and the pile was measured. From the data obtained, normal frequency distributions were found for length of stick, density, diameter, and shrinkage in volume caused by reducing the sticks to 50-in. length. No relationship was found between average stick diameter and solid volume per cord. Average density was found to increase with decreasing average diameter. The solid volume per cord from actual stick measurements was estimated at 107·1 cu. ft. as against 105·7 obtained by a photographic method [see *For. Abstr.* 5 (p. 206)]. The results for solid volume per cord were in substantial agreement with those reported by Martin [see *For. Abstr.* 4 (p. 40)] for similar wood and the relationship between sticks per cord and average diameter were also in good agreement with Martin's data. *From author's summary.* [Cf. *For. Abstr.* 11 (No. 2999).]

54. FACTORS CONNECTED WITH ASSORTMENT

3381. SCHOBER, R. **Sortentafeln für die europäische Lärche. [Assortment tables for *Larix decidua*.]** Wilhelm Schmitz Verlag, Giessen. [1946?] pp. 15. [G.]
Cf. *For. Abstr.* 11 (No. 3388).

56. INCREMENT

See also *For. Abstr.* 11 (Nos. 3241–2, 3396).

3382. KREUTZINGER, M. **Definition of increment on large areas.** *Proc. World For. Congr.* No. 1, 1949 (69–79). [E.f.]

The discovery of one common method for volume and growth survey of large forest areas for all countries is impossible for economic reasons. In order to obtain comparability of the recorded increment by survey, it is necessary to establish one common method of increment determination, applicable to different methods of survey. The author reviews the various methods in use, and concludes that Gieruszynski's graphic method allowing for a random choice of sample trees and the measurement of increment in felled sample trees by applying Pressler's stand method, is suitable for the purpose.

3383. MEYER, H. A. **Berechnung und Auswertung des Stärkezuwachses. [Calculation and evaluation of diameter increment [in selection forest].]** *Schweiz. Z. Forstw.* 100 (1), 1949 (27–38). 10 refs. [G.f.]

Points out the weaknesses of the formula put forward by Prodan [cf. *For. Abstr.* 9 (No. 1340)] for discovering the diameter increment of different diameter classes in managed selection forest, and outlines the method described by Schaeffer, Gazin and d'Alverny (1930) for calculating the volume of different diameter classes. The latter supplements the method laid down by Prodan, in that it takes account of intermediate fellings. The discussion is illustrated by an example taken from the instructional forest of the Eidgenössische Technische Hochschule. The effect of precipitation on periodic fluctuations in rate of increment is briefly discussed.

3384. AREND, J. L., GUNDERSON, W. R. H., and MONROE, A. F., **Growth of unmanaged Oak-Hickory wood lots in Southern Michigan.** *Tech. Notes Lake St. For. Exp. Sta.* No. 327, 1950. pp. 2.

57. DEVELOPMENT AND STRUCTURE OF STANDS. YIELD

See also *For. Abstr.* 11 (Nos. 2539, 2621–2, 2636, 3375).

3385. GUILLEBAUD, W. H., and HUMMEL, F. C. **A note on the movement of tree classes.** *Forestry* 23 (1), 1949 (1–14).

The object of the investigation described in this paper was to find how the various tree classes (dominant, co-dominant, sub-dominant, and suppressed) are represented in pure, even-aged crops at different ages and under different thinning treatments, and to what extent individual trees tend to maintain or change their relative position in the canopy during the life of a stand. The species investigated were *Picea abies*, *P. sitchensis*, *Pinus sylvestris*, *Larix leptolepis* and *Pseudotsuga taxifolia*, which had been thinned and re-measured 4–8 times over a period of 15–25 years. The data are set out in tables and diagrams. In nearly all plots, the dominant class shows a net loss to the sub-dominant class and the latter a net gain, during most periods, indicating a general downward trend in the movement of tree classes. At the end of the period, the

small number of survivors among the original co-dominants were distributed among the first three classes in varying proportions, but in most plots the majority remained co-dominant. Taking all 12 plots together, only 5% of original sub-dominants were left standing—1% as co-dominants, 2% as sub-dominants, and 2% as suppressed, dead, and dying; not one had become dominant. In all but 2 of the plots, more than 90% of present dominants have always been dominants (the exceptions are Sitka Spruce (C-grade thinning) 87%, and Scots Pine (B-grade thinning) 79%). The small number of dominants originating from other classes all come from the co-dominant class. The origin of the present co-dominant and sub-dominant classes is less uniform. Of the present crops as a whole, 55–98% are derived from the original dominant class, and in each pair of plots the % is higher in the D-grade (heavy low thinning) plot than in the B-grade (light low thinning). Between 2 and 40% of the present crops are derived from the original co-dominant class, and 0–7% from the original sub-dominant class. For these two classes the percentages are usually higher in the B-grade plots than in their more heavily thinned counterparts.

The results are compared briefly with those of Flury, Gutmann, and Zimmerle [cf. *For. Abstr.* 3 (p. 130)] which confirm the present findings that there is a general downward trend in the movement of tree classes, so that with increasing age an ever larger proportion of the growing stock consists of trees that were originally dominant.

3386. MACLEAN, D. W. **Forest development on the Goulais River watershed, 1910–1946.** *Silv. Res. Note. For. Serv. Can.* No. 94, 1949. pp. 54 + 1 map. 6 refs.

Information on stand development following cutting has been collected during 36 years on the Goulais River Observation Area in the Algoma district of Ontario. [For earlier reports on this project see *For. Abstr.* 1 (pp. 86–7)]. The present report analyses all information obtained to date. A total of *ca.* 532 cu. ft./acre of Spruce and Balsam Fir was removed in 1910 from the softwood type. In 1946 the total volume of these species was about the same as in the stand before cutting, and the total volume of hardwoods had increased about 50%. In the mixed-wood type, a total of *ca.* 321 cu. ft./acre of Spruce and Balsam Fir was cut in 1910. Only about one-third of this volume had been replaced by 1946. The total volume of hardwoods had apparently increased and the total volume of all species was about the same in 1946 as before cutting in 1910. It is apparent that the Spruce and Balsam Fir in both types were much less defective in 1946 than they were before cutting. Growth of individual trees is generally good, but improvement in stocking is retarded by shrub competition and overhead interference by large hardwoods. These cut-over types could apparently be highly productive if suitable silvicultural practices were followed. *From author's summary.*

3387. DORMAN, K. W., and DAVIS, T. H. **Virginia Pine may make rapid growth in Carolina Mountains.** *J. For.* 48 (1), 1950 (48).

Virginia Pine has hitherto been regarded as a weed species, but measurements of a 40-year-old field stand showed that growth had been one cord/acre/year. The yield of pulpwood from the clear-felled stand was 40 cords per acre.

3388. SCHOBER, R. Ertragstafel für europäische Lärche 1946. [**Yield table for *Larix decidua*, 1946.**] R. Schober, Grünberg-in-Hessen. 1946. pp. 11. [G.]

A pre-print from the author's '*Die Lärche, eine ertragskundlich-biologische Untersuchung*', consisting chiefly of tables for moderately thinned stands from 5 to 140 years old, in 3 yield classes (*Ertragsklassen*).

Cr. *For. Abstr.* 11 (No. 3381).

3389. SZYMKIEWICZ, B. Niektóre zagadnienia dotyczące tablic zasobności drzewostanów sosnowych. [**Some problems concerning yield tables for Pine.**] *Rozpr. Spraw. Inst. Bad. Leśn.* No. 54, 1949. pp. 67 + 6 tbls. [Pol.russ.f.]

Discusses the best method of using yield tables, compares results from Schwappach's, Płoński's and Jedliński's tables, describes their application to certain Polish Pine stands and reviews their utility for calculations in Poland. Schwappach's tables are recommended as the most suitable for Polish use. *From author's summary.*

6. MANAGEMENT. WORKING PLANS. SURVEYS

See also *For. Abstr.* 11 (No. 3366).

60. GENERAL LAND MANAGEMENT

60.3. *Management of Different Classes of Forest*

See also *For. Abstr.* 11 (Nos. 3429, 3446–8, 3450).

3390. PRESTON, J. F. **Farm wood crops.** McGraw-Hill Book Co., Inc. 1949. pp. viii + 302. 79 refs. Price $3.75 [£1. 12*s.* 0*d.*]

The purpose of this book is to present a technical guide to the development of a farm-woodland enterprise integrated with the farm business. Only the simplest woodland techniques are presented. Emphasis is on the job of correctly presenting the case of farm-woodland management to farmers. The reference throughout is to conditions in the U.S.A. *From author's preface.*

3391. Conditions et possibilités d'action du service forestier dans le Département de la Moselle. [**Conditions and possibilities of action by the Forest Service in the Département de la Moselle.**] *Rev. for. franç.* 1950 (1), (17–30). [F.]

Gives a summary account of the extent and conditions of the forests and of Poplar plantations in the Département, and discusses the possibilities for the Forest Service to give help and advice to private owners for the improvement of their forests.

3392. GILORMINI, J. A. **Problems of tree propagation for farm forestry.** *Carib. For.* 10 (4), 1949 (267–9, 306–7). [E.Span.]

Notes on forest nurseries in Puerto Rico and the distribution of seedlings.

3393. MARRERO, J. **What tree species are adapted to farm forest lands?** *Carib. For.* 10 (4), 1949 (244–9, 283–8). [E.Span.]

In Puerto Rico sharp differences in rainfall within short distances, a very rough topography, and local agricultural practices have rendered site conditions for forests very variable. For many years experiments have been made with various species on a trial-and-error basis. A classification of sites is presented, based on the following factors—climate, soil depth, drainage and topography or soil deterioration. Tree species suitable for each type of site are recommended.

3394. MARRERO, J. **What are the uses of farm forest tree species?** *Carib. For.* 10 (4), 1949 (249–53, 288–92). [E.Span.]

A list of recommended species, their properties and uses.

3395. WADSWORTH, F. H. **How should farm forests be managed?** *Carib. For.* 10 (4), 1949 (253–9, 292–8). [E.Span.]

Practical recommendations for the rational management of existing farm forests in Puerto Rico, including notes on the maintenance of optimum stand density, felling procedure and suitable species.

3396. WADSWORTH, F. H. **What will be the returns from farm forestry?** *Carib. For.* 10 (4), 1949 (259–66, 298–306). [E.Span.]

Presents data on the growth rates (based on diameter increment) of some Puerto-Rican species, tabulated by species, location, type of site and ages at which the trees are suitable for use as fuel, poles and sawtimber.

3397. MCCLAY, T. A. **Returns from southern Appalachian experimental farm woodlands.** *Sth. Lumberm.* 179 (2249), 1949 (219–21). [Southeastern Forest Experiment Station.]

Four areas in the Bent Creek Experimental Forest, near Asheville, N.C., were set aside in 1945 to be managed as farm woodlands—2 for small, and 2 for large products. Annual records have been kept showing the cash returns that a farmer could expect; those for 1946–48 are presented.

61. SURVEYING. MAPPING

See also *For. Abstr.* 11 (Nos. 3362, 3366, 3379).

3398. PARSONS, H. H. **Aerial timber sketching.** *For. Chron.* 25 (4), 1949 (257–9). Cf. *For. Abstr.* 10 (No. 1495).

3399. CHAPMAN, G. W. **Forest reconnaissance by helicopter.** *Emp. For. Rev.* 28 (4), 1949 (340–2 + 2 photos).

Describes the work of forest reconnaissance and stock mapping in Iraqi Kurdestan, for

part of which a Bell Aircraft Co. 2-seater helicopter was used. In 12 sorties of a total flying time of 16 hours, *ca.* 3,055 sq. miles was surveyed in this way. The aircraft averaged 60 m.p.h., and it was found most suitable to fly at 4,000–6,000 ft., i.e. a little above the general level of the nearest ranges or 1,500–2,000 ft. above the average level of the country traversed. Under these conditions it was perfectly simple to navigate and, at the same time, to record detail on the 1/100,000 field maps. No attempt was made to sketch in boundaries between forest and field, or between one forest type and another. Changes of type were recorded by jotting in symbols all over the field maps, and these proved amply sufficient when the time came to reduce detail to the ¼-in. forest map. It would have been possible, by reducing air speed, to have sketched in boundaries accurate to the scale of the field maps, had this been wanted.

The recognition of different tree species from the air proved easy in the case of species with foliage of distinctly differing colour or form, but it was impossible, even from less than 100 ft. above the tree tops, to distinguish e.g. one species of Oak from another. A helicopter can, however, usually be landed in even a very small clearing, enabling the observer to examine the forest, collect specimens or soil samples, and then continue his journey. It can be put down safely within a plot of 20-yds. diameter.

3400. SEELY, H. E. **Technical developments in air surveys and interpretation of forestry data.** *B.C. Lumberm.* 33 (11), 1949 (59–60, 108, 110–11). 6 refs.

A review of modern methods.

3401. DIMBLEBY, G. W. **Air photographs and forestry.** *Wood* 14 (11–12), 1949 (332–4; 370–2); 15 (1), 1950 (11–13).

General observations; mapping, mensuration and interpretation; identification, planning and costs.

3402. CLASON, M. S. Flyfotografier istedenfor krokikarter i skogbruket. [**Air photographs instead of sketchmaps in forestry.**] *Norsk Skogind.* 4 (1), 1950 (17–21). 5 refs. [Nor.e.] P.R.

The methods of a Norwegian firm using air photographs in forestry are described.

3403. HAN LIOE WAN and PAIJMANS, K. De afdeling 'luchtfotobewerking' van de dienst van het boswezen. [**The aerial photography division of the [Indonesian] forest service.**] *Tectona* 39 (3), 1949 (237–51). 3 refs. [Du.e.]

Account of methods, instruments, and training of staff for interpretation of air photographs.

3404. WILSON, R. W. **Controlled forest inventory by aerial photography.** *Timberman* 51 (4), 1950 (42–3, 98).

3405. CHOATE, G. A. **Aerial photographs—an efficient tool in management plan surveys.** *J. For.* 47 (12), 1949 (961–5).

Describes the methods used by the North Central Region of the U.S. Forest Service for making a timber inventory and revising forest maps by the use of air photographs. The successive steps are as follows:—(1) Obtaining new air photos (scale 4 in. = 1 mile), (2) outlining condition classes (defined by type, size-class and density), roads, transmission lines, drainage etc., in different coloured inks on the photos, (3) field checking of mapped photos, (4) preparation of maps from photos, (5) computation of acreages, (6) volume determinations from sample plots. The method of computing the intensity of sampling needed to give a required degree of accuracy, is indicated.

3406. NASH, A. J. **Some tests of the determination of tree heights from air photographs.** *For. Chron.* 25 (4), 1949 (243–9). 7 refs.

Presents the results of an investigation of the degree of accuracy obtainable in the determination of tree heights from air photographs. The quality of the photographs was very high, with a snow background giving good contrast to both tree images and shadows. The methods of measurement are given in detail, and a comparison made between photogrammetric results and field-check measurements. Measurements of height from tree images on obliques gave better results than those from shadows on vertical photographs but both gave reasonably accurate results for the purpose of preparing stand-volume estimates. The same is true of measurements of crown widths. The chief sources of error are enumerated.

3407. MACDONALD, D. A. **The Seely-scope.** *For. Air Surv. Leafl. For. Serv. Can.* No. 4, 1949. pp. 7.

The Dominion Forest Service has now evolved an instrument combining the advantages of the Monoscope and the Duoscope. It is intended for use as a simple transfer device, not as a stereoscopic plotter. A feature which is common to all three instruments is the special patented means of horizontal scale adjustment. The advantages of the Seelyscope (illustrated in various positions) are:—wide range of scale adjustment; multiple use as a camera lucida, as a duoscope, and as a minor stereoscope which can be adjusted, if necessary, to fuse photographs of differing scales or to view enlargements; the design of the instrument, which permits the ready use of a tiltable platform for the photographs or the map, with a view to adjustments for tilt and displacement; the simple structure of the instrument, which permits direct transfer of detail to the map and allows rapid adjustment, ease of operation, and optimum illumination of both photograph and map. The instrument is described in some detail. Quotations may be obtained from the following companies which are licensed to manufacture this instrument under Canadian Patent No. 392,431: Spartan Air Services Ltd., 473 Wellington St., Ottawa, and the Prichard-Andrews Co. of Ottawa Ltd., 264 Sparks St., Ottawa.

3408. Losee, S. T. B. **Some aspects of inventory surveys from aerial photographs.** *For. Chron.* 25 (4), 1949 (250–6).

Describes a method of combining field and photographic data in use at Abitibi. The basic data for volume estimates and species and diameter groups is obtained from ground work. Data from air photographs provide type boundaries, species composition by groups, height of stand and density of stocking.

3409. Pratelli, G. Problemi e apparati fotogrammetrici per le misure forestale. **[Problems and equipment for photogrammetry in forest mensuration.]** *Ital. for. mont.* 4 (6), 1949 (350–61). [It.]

Briefly describes the uses and methods of ground photogrammetry and explains in some detail the use of a double stereometric camera and a phototheodolite.

3410. Atkins, E. S. **Simplified plane-table orientation.** *Silv. Leafl. For. Serv. Can.* No. 33, 1949. pp. 2.

3411. Cromer, D. A. N. **Extracting small irregular areas.** *Aust. For.* 13 (1), 1949 (64–6). 3 refs.

The writer has for some time used a transparent dot grid for the purpose of measuring small, irregular areas (e.g. the areas of different forest types), which has proved much more rapid and less fatiguing to use than the conventional planimeter. Maps to be measured are gridded with 4×4-in. squares, and a transparent templet fitted over each square in turn. The templet is divided into 16 1-in. squares, with 100 regularly spaced dots in each square, and the number of dots falling inside and outside the area to be measured, are counted and tallied separately. As the total number of dots (1,600) for one placement of the grid is tallied, omissions are quickly detected and there is no need for a reconciliation or adjustment of areas at the end. Conversion to acreages is simple. For example, at a scale of 20 chains to an inch (i.e. 40 acres/sq. in.) and a count of 365 dots, the area is $3{\cdot}65 \times 40 = 146$ acres. The grid was drawn at 4 times the size required and photographically reduced to give a diapositive with the emulsion on the under side, so that marking with a china pencil would not damage the emulsion. Pencil marks (e.g. striking out dots as counted) can be wiped off readily with a cloth. Tested against calculated areas of regular figures, and planimetered areas of irregular figures, this grid proved accurate to within 0·5%.

64. DESCRIPTION OF SITE. ASSESSMENT OF SITE AND STAND QUALITY

See also *For. Abstr.* 11 (No. 2494, 2566, 3393).

3412. Witold - Alexandrowicz, B. Systemizacja siedliskowa według idei kompleksowych typów lasu. **[The classification of sites according to forest types.]** *Rozpr. Sprawozd. Inst. Bad. Leśn.* No. 53, 1948. pp. 86 + 8 photos, 1 map. 23 refs. [Pol.pol.e.]

The writer begins by stressing that modern management is based on the classification of sites according to their quality. The natural vegetation of Poland has been disturbed by man in the course of time, thus limiting the application of Cajander's methods of classifying sites. It is, however, suggested by the writer

that Cajander's method can be applied if soil, which represents one of the elements of a forest association, is taken as an additional indication of the quality of the site. The writer gives details of his tests of this composite method, under the aegis of the Polish Forest Research Institute, for the classification of sites in the National Park near Poznan in Western Poland. The results seem to have been satisfactory.

3413. Viro, P. J. Metsämaan raekokoomus ja viljavuus varsinkin maan kivisyyttä silmällä pitäen. [**The mechanical composition and fertility of forest soil taking into consideration especially the stoniness of the soil.**] *Commun. Inst. for. Fenn.* No. 35 (2), 1947 (1949). pp. 115. 121 refs. [Fi.e.]

For the purposes of this study, stoniness was measured as the volume % of stones of more than 2 cm. diameter in the soil. The study deals with *Pinus sylvestris* and the 3 most important Pine forest site types in S. Finland, viz. *Myrtillus* type (*MT*), *Vaccinium* type (*VT*), and *Calluna* type (*CT*). The superficial deposits are morainic soil, gravelly soil, and stoneless soil. The methods of study are described in detail. On morainic soils, correlation coefficients between stoniness and current growth reach their maximum at the age of 20–50 years. Later, the coefficients of height and diameter growth decrease very rapidly. Correlation coefficients between stoniness and average growth reach their maximum value later and they are higher than the corresponding coefficient of current growth. Correlation coefficients between stoniness of surface soil (0–30 cm.) and site fertility are higher than those between stoniness of subsoil and site fertility. The latter are negligible when the trees are young and reach their maximum value later than those for surface soil. Accordingly, the influence of subsoil on site fertility on morainic soils is notably less than that of surface soil. The difference in fertility between *MT* and *VT* sites of similar stoniness is much the same as on stoneless soils. The productive capacity of soil of stoniness class II (30–60% stoniness) was found to be about 25% lower than that of class I (0–30% stoniness).

In studies of soil fertility, only the soil part finer than 2 mm. has generally been analysed. The present study revealed that the correlation between % of fine earth and site fertility is much greater when the % is calculated on the soil as a whole (i.e. taking into consideration rocks, stones, gravel etc.). No correlation was found between the moisture equivalent of some soil strata and fertility, and the author concludes that on morainic soils, stoniness is the most important factor influencing site fertility, and that this is due to its capacity for diminishing the % of soil particles from which plants obtain their principal nourishment.

On glaci-fluvial deposits, no connexion existed between particle size of soil and site fertility. In surface soil there was no correlation between moisture equivalent and site fertility, but the correlation increased with increasing depth and at 60–100 cm. depth it was $0{\cdot}63 \pm 0{\cdot}11$.

Judging by ground vegetation alone, the morainic soil was richer than the glaci-fluvial deposits, but the dominant tree was larger on the latter. This is due to the difference in the ability of trees and ground vegetation to absorb water from the soil. Accordingly, it is not always safe to classify sites exclusively on the basis of ground vegetation.

All tables have captions in English as well as Finnish.

3414. Storie, R. E., and Wieslander, A. E. **Rating soils for timber sites.** *Proc. Soil Sci. Soc. Amer. 1948* 13, 1949 (499–509). 12 refs. L.S.

Presents results derived from studies of 1½ years' duration on soils, climate and timber site quality in California. The studies were made to supplement the State forest survey. At 163 field locations, soils were examined and classified and the timber site quality was determined by referencing the height and age value to appropriate site class curves. Four main soil factors appear to govern the growth of conifers in California. These are (1) depth and texture, (2) permeability, (3) chemical properties and (4) drainage and run-off. A preliminary timber rating chart is presented, based on the above 4 factors plus the climatic factor. High sites for conifers in California need a deep soil of sufficiently fine texture to hold about 12% or more of moisture, a permeable profile, no toxic chemical characteristics, an acid reaction, good drainage, and a total annual rainfall of more than 40 in. *From authors' summary.*

3415. Tarrant, R. F. **A preplanting forest soil survey.** *J. For.* 48 (2), 1950 (104–5).

Describes a simple method of soil survey for determining the quality of Douglas Fir planting sites on denuded land in the Pacific North-West. A soil-rating index is constructed, taking into account the following factors, each of which can be rated as good, medium, or poor:—soil depth, surface soil texture (medium, coarse and heavy), subsoil consistency (friable or slightly compact, moderately compact, very compact), surface organic matter (½ in. or more of litter, scattered litter, bare mineral soil), slope % and aspect.

3416. BLOOMER, L., and GALLOWAY, J. A. **Just the job.** *Quart. J. For.* 44 (1), 1950 (11–8). 2 refs.

Describes a method of surveying the work to be done in the woods of a private estate and arranging it according to priority, having regard to the current shortages of labour and materials, neglect of silvicultural operations during the war, etc. The authors have modified the 'record of condition of woods' form of H. M. Steven [cf. *For. Abstr.* 6 (200)] to cover the type of crop occurring in England, and recommend its use for summarizing and giving a clear picture of the woods on an estate. In the case of under-stocked areas, the following is the ideal order of priority of fencing and planting, though expediency often dictates modification: (1) Areas where natural regeneration has occurred but needs protection from browsing, stool-shoots, Elder etc., the planting being directed to completing the stocking. (2) Clean areas with good soils and situation and of economic size and shape (over 5 acres and needing less than 150 yd. of rabbit fencing per acre of planting). (3) Steep slopes or very light soils where browsing or burrowing prevent turf's forming to check erosion. (4) Other clean areas. (5) Areas with good soils and situations and of economic size and shape, that need clearing. (6) Other areas needing clearing.

65. DESCRIPTION OF GROWING STOCK

3417. ROWE, J. S. **Characterization and comparison of forest stands by means of phytographs.** *Silv. Res. Note For. Serv. Can.* No. 93, 1949. pp. 8.

In the description and comparison of forest stands, a simple graphical method of setting forth important quantitative features is useful. The phytograph proposed by Lutz has much to recommend it in this respect. A quadrangular figure is constructed on 4 axes representing what are taken to be the most important criteria for assessing the status of each tree species in the stand (in the example given, abundance of trees 10 in. d.b.h. and over in %, frequency of occurrence in %, number of age classes commonly represented, and basal area in sq. ft./acre). The phytographs may be drawn individually for each species or superimposed on the same set of axes to facilitate comparisons. An impression of 'mass effect' of the factors plotted is obtained, yet any particular factor is readily isolated for study. In this note, an example of the method is given, showing how a study and comparison of phytographs may bring out relationships that might otherwise go unrecognized. Phytographs can be adapted to a variety of studies by the simple expedient of changing the criteria by which each species is characterized. Fewer or more than 4 criteria may profitably be used for the presentation of data relating to certain problems. For example, Jack Pine stands of equal age subjected to different degrees of thinning might be represented for purposes of comparison by phytographs constructed on 5 axes on which are shown their respective :—(1) average spacing of stems, (2) average increase in diameter of stems, (3) average increase in height of stand, (4) volume increment per acre, (5) mortality per acre. It seems best to use only such characteristics as are clearly related to one another, otherwise the 'mass effect' of the phytographs ceases to have any significance.

66. YIELD REGULATION.

SUSTAINED YIELD

3418. WECK, H. Untersuchung zur möglichen Obergrenze einer nachhaltigen Ertragsleistung der Waldgebiete Deutschlands. [**Research on the potential upper limit of sustained productive capacity for the German forest area.**] *Mitt. ZentInst. Forst- u. Holzw.* No. 10, 1949. pp. 5. [G.e.] P.R.

3419. TURC, L. Les forêts résineuses du Haut-Doubs. [**The coniferous forests of the Haut-Doubs.**] *Bull. Soc. for. Franche-Comté* 25 (5; 6; 10; 12), 1948–49 (191–202; 228–35; 382–93; 464–74). [F.]

The first part of this study gives a brief account of the origin and history of these forests, with a rather fuller description of the methods of management employed under the Second Empire (uniform system regulated by fixed periodic blocks). The second part describes and discusses the method of regulation employed for the past 40–50 years (floating periodic block) in order to deal with the difficulties of regeneration that arose under the former system. Selection methods are employed only on very steep slopes, in the high mountains, and in stands worked for resin. The author believes that the current methods are suited to local conditions, provided that the flexibility which is the principal advantage of the floating-periodic-block system is not abused in practice.

3420. PEPLER, W. A. E. **Action taken by industry to attain sustained yield [by the Canadian pulp and paper industry].** *For. Chron.* 25 (4), 1949 (307–10).

3421. **Forest management licences: an explanation of that section of the 'Forest Act' dealing with Forest Management Licenses.** *Publ. B.C. For. Serv.* No. *B.37* (revised) 1948. pp. 42.

Cf. *For. Abstr.* 10 (No. 1503).

3422. SHARPE, J. F. **Sustained yield through legislation (in Ontario).** *For. Chron.* 25 (4), 1949 (292–6).

3423. LACHANCE, P. E. **Sustained yield management in Quebec.** *For. Chron.* 25 (4), 1949 (304–6).

7. FOREST ECONOMICS, VALUATION, AND FINANCE

See also *For. Abstr.* 11 (Nos. 2636, 3440).

73. RATE OF INTEREST

3424. GUTTENBERG, S. **The rate of interest in forest management.** *J. For.* 48 (1), 1950 (3–7). 21 refs.

The author distinguishes 4 concepts covered by the term *interest*:—(1) The *pure rate* is the rate on the use of capital essentially devoid of any risk of loss. (2) The *risk rate* of interest is added to the pure rate as the insurance premium necessary to protect the owner from loss of income. (3) The *profit rate* of interest is ordinarily added, along with (2), to (1) as an inducement to accept the risk. (4) *Individual time-preference* is the premium placed by the individual upon present as compared with future goods. This concept is important to foresters who are called upon to work on the depleted woodlands of small owners. Where the small owner has a high time-preference rate, it may be impossible to interest him in good forest management as a business venture. *From author's summary.*

74. VALUE OF THE STAND. VALUE OF THE FOREST

3425. GUTTENBERG, S. **Good trees—good lumber—surer profits.** *Sth. Lumberm.* 179 (2249), 1949 (132–5).

Presents a method of calculating the value of timber in Southern Pine of various diameter classes. Index numbers for the main grades of Southern Pine lumber are derived from their average prices over the years 1925–40 in relation to the price of No. 2 Common. These are used in conjunction with tables giving average number of logs and their grades in Pine of various diameter classes (based on data from the Crossett Experimental Forest) in order to find the gross and net lumber values of the trees.

76. MANAGEMENT STATISTICS

See also *For. Abstr.* 11 (Nos. 2669, 2691, 2852, 2869, 3008, 3082, 3229, 3397).

3426. ZEHNGRAFF, P. **Monetary yields from a managed Pine forest [in Minnesota].** *Tech. Notes Lake St. For. Exp. Sta.* No. 330, 1950. pp. 1.

A managed Pine forest in northern Minnesota can yield average annual earnings per acre of $3–4 as stumpage or $9–10 as logs and bolts.

3427. CHAPMAN, H. H. **Private management of Monterey Pine at Nelson, New Zealand.** *J. For.* 47 (12), 1949 (981–2).

The plantations described were made during the years 1923–25, using seed from selected trees with narrow crown and small branches.

Initial spacing was 9 × 9 ft. or 538/acre. The first thinning, for the production of sawlogs, was started at the age of 11 years in the 1923 crop and completed in 8 years when the 1925 crop was 17 years old. This thinning was from above, removing dominant and wolf trees, and leaving co-dominant and intermediate trees. Owing to the youth of the stand and wide spacing, crowns were still long and recovery satisfactory. Average yield from this thinning was 6,382 bd. ft./acre. It is calculated that costs plus 4½% compound interest, were fully met by the 14th year from the cash income. From then on, the operation was on an annual profit basis. A second thinning, started at the age of 19 years, was exactly opposite in principle to the first thinning. Begun in 1941, it will be completed in 1950, when the 1925 planting will be 25 years old. With 3 years to go (1948) the yield has been 9,594 bd. ft./acre or a total for the two thinnings of 15,976 bd. ft., which will be increased by the greater age of the remaining 3 years' cut. The second thinning has left the final crop trees spaced 18 × 20 ft., averaging 120/acre. It is planned to keep to a rotation of 37 years; any longer rotation would produce advance reproduction in spots and hamper the management of the next even-aged stand. Another argument against a rotation longer than 37 years is the accumulation of interest and taxes. In order to make as great an advance as possible towards a normal series of age classes for the working circle, the final clear cutting will begin in 1951 in the oldest stands (aged 28 years) and the operation be spread over 20 years, giving 20 age gradations in the new forest, instead of the original 3, while a complete series of age gradations will be obtained in the third rotation. It is expected that the plantations will regenerate naturally after clear felling.

3428. O reflorestamento artificial como preservativo das nossas reservas florestais. [**Artificial regeneration for the preservation of our forest reserves.**] *Brasil madeireiro* 4 (41), 1948 (26–7). [Port.]

Presents a comparison of costs of creating and maintaining *Eucalyptus* stands for charcoal with the profits obtained from the product. A list of 10 *Eucalyptus* spp. and the nature and amount of by-products obtained from them during charcoal manufacture is included.

3429. James, N. D. G. **Costings for estate woodlands.** *Quart. J. For.* 44 (1), 1950 (20–6).

Describes a simple but accurate system of cost accounting for forestry operations on a private estate and gives details of the records it is necessary to maintain.

9. FOREST POLICY

90. GENERAL PRINCIPLES OF FOREST POLICY

See also *For. Abstr.* 11 (Nos. 2448, 3203, 3391).

3430. **Sixteenth report from the Select Committee on Estimates; Session 1948–49, The Forestry Commission.** H.M. Stationery Office, London. 1949. pp. xviii + 154.

Includes minutes of the proceedings of the committee, minutes of evidence taken, and a number of memoranda by the Forestry Commission and other bodies on special questions, including the constitution, finances and operations of the Forestry Commission; acreages, costs and profits; sample costs; costs of silvicultural operations, roads and houses; timber prices; costs and prices in private forestry; pitprops; thinning subsidy; cost of roads.

Amongst the recommendations of the committee are the following:—In general, timber merchants should be encouraged to do felling, extraction and conversion in the Commission's forests in those instances where such a course is not disadvantageous to the Commission. Road operations should at present be limited to those that are necessary to extract profitable thinnings, or save a great deal of travelling time by forest workers, or are vital for fire-fighting purposes. Advice should be taken from timber merchants and from foreign experts on alternatives to road construction, and wherever possible, wire ropeways should be installed to save building roads.

3431. Champion, H. G. **The future of our new forests.** *E...p. For. Rev.* 28 (4), 1949 (324–31).

Presidential address Section K (Botany), subsection K* (Forestry) at the British Association for the Advancement of Science 1949. Outlines the problems that will arise as a result of the new plantations being formed in Great Britain, under the heads: (1) risks to be insured, (2) forest management, (3) man-power and mechanization, and (4) marketing and utilization.

3432. CLEAR, T. **Irish forestry—to-day and to-morrow.** *Irish For.* 6 (1/2), 1949 (3–12).

A discussion of general policy.

3433. VAHID, S. A. **Forests and forest policy in Pakistan.** *Agriculture Pakistan, Karachi* 1 (1), 1949 (26–31). O.R.E.

Reviews past forest policy and briefly outlines one for the future. For a well balanced economy Pakistan is estimated to need 25% of her land area under forest. Cases may arise where forestry should take precedence over agriculture, e.g. to serve centres of demand at present remote from sources of forest produce, to give employment to cultivators in their slack seasons, and where protection forests must be maintained. The author further urges effective control, within the framework of a special Act, over private forests and the large-scale exploitation (with mechanical extraction) of the mature and over-mature growing stock in the less accessible forests of Eastern Pakistan.

3434. GRIFFITH, A. L. **Reconnaissance report on the forest problems of the Zanzibar Protectorate.** Government Printer, Zanzibar. 1949. pp. 50.

Reviews the following questions and makes recommendations for action on them:—Mangroves [cf. *For. Abstr.* 9 (p. 263)], erosion, timber and fuel supply, the bush country, the forests, fuel outturn, goats in the bush country, avenue trees, farm forestry, control of weeds, legislation, staff, exotic species possibly suitable for certain conditions. The report is based on a 6 months' rapid survey of Zanzibar and Pemba.

3435. Resolução No. 85 do I.N.P. **[Resolution No. 85 of the Instituto Nacional do Pinho.]** *Brasil madeireiro* 4 (44), 1948 (23–36). [Port.]

Gives the full text of the resolution of October 1945, whereby standards are proposed for regulating the exploitation of timber in Brazil. Among the subjects covered by the resolution are:—fellings, reforestation, establishment of new forest products industries, sawmilling, veneer, plywood and pulp manufacture, control of the timber market, taxes and emoluments.

91. SOCIAL AND ECONOMIC INFLUENCE OF THE FOREST. NATIONAL PARKS. RESERVES. FOREST INFLUENCES

91.1. *Rural Preservation. Reserves. National Parks. Plant and Animal Protection*

See also *For. Abstr.* 11 (Nos. 3312, 3323–4).

3436. CARVALHO, J. M. DE. Os serviços florestais e o problema da protecção à natureza e reserva da vegetação. **[The forest service and problems of protection and conservation.]** *Publ. Serv. flor. aquic. Portugal* 10 (1), 1945 (125–34). [Port.e.]

Reviews the objects envisaged in the creation of the Portuguese forest reserves, provided for by the law of July 1938.

3437. FLORES, F. A protecção da natureza, base científica da silvicultura. **[Protection of nature, the scientific basis of silviculture.]** *Publ. Serv. flor. aquic. Portugal* 10 (1), 1943 (135–51). [Port.e.]

Discusses disturbances of the biological equilibrium brought about in Portugal by deforestation, by the highly artificial system of managing *Quercus suber* and *Q. ilex* south of the Tagus, and by the mass introduction of exotic species in reforestation north of the Tagus. The author believes that the forests should be preserved, or reconstituted, as far as possible in their natural form, and that the systems of managing *Q. suber* and *Q. ilex* should be reviewed. For this purpose reserves should be created and an intensive study made of the plant associations natural to the country.

3438. CHASE, W. W. **Recent advances in forest game management.** *J. For.* 47 (11), 1949 (882–5). 16 refs.

91.3. *Influence of the Forest on the Environment*

See also *For. Abstr.* 11 (Nos. 2495–7, 2699).

3439. RANGANATHAN, C. R. **Protective functions of forests.** *Indian For.* 76 (1), 1950 (2–11). 15 refs.

Paper contributed to the U.N. Scientific Conference on resources, 1949.

91.8. *The Forest as a Source of Employment and Income*

See also *For. Abstr.* 11 (No. 2436).

3440. GRØN, A. H. Skovarbejdets grænseproduktivitet og dennes skovbrugsmæssige betydning. **[The marginal productivity of forest labour and its importance to forestry.]** *Tidsskr. Skogbr.* 56 (11/12), 1948 (300–307). [Dan.]

A lecture. Grøn stresses the fact that in practical forest policy-making the indirect benefits of forests and forestry have never been calculated. Among such benefits is the provision of employment. Theoretical forest economics has also neglected to consider the full rôle of wages in the economic balance, for the most part merely taking wages at fixed levels regarded as beyond the scope of discussion. The development of labour movements and modern social policies, however, make it important to examine such questions. If labour is employed productively, though with a financial loss to the private employer, the national income is increased and the cost of State unemployment relief decreases, so that the State should be in a position to give financial support to the industry concerned. Such a State subsidy could be up to the amount saved in social security funds and might be larger, in view of the fact that the extra workers employed may yield additional revenue from taxation.

An idea of the marginal productivity of forest labour can be gained by assuming fixed values for soil expectation value and interest in Faustmann's formula and solving for wages as the unknown. Using this procedure Grøn has prepared a table setting forth the various factors and the calculated 'natural' wage-rates per hour so obtained, for producing Norway Spruce of quality classes 3, 4 and 5 in Denmark. But as wages are governed by tariffs, it is only for quality class 3 that a profit is shown, the lower quality classes giving losses. Dole payments would greatly exceed the cost of subsidizing forestry sufficiently to make it pay to raise Spruce of these two classes. The example, is of course, a simplification, but does indicate the type of exploration to be done. In practice, the increased employment in forestry would provide increased employment in the wood-using industries and so on. Much more comprehensive work on these lines is needed for other industries and occupations before an exact numerical basis could be furnished for State labour policies. It is likely, however, that forestry would stand high in the list of claimants for subsidies on these grounds.

3441. MERIKALLIO, E. Metsänhoitajakunnan kasvu ja metsätaloutemme tehostaminen. **[The increase in [trained] foresters calls for an intensified forest economy [in Finland].]** *Metsät. Aikak.* 1949 (10), (329–31). [Fi.e.]

A comparison is drawn, supported by graphs, between Sweden and Finland. Sweden before the 1939–45 war had a somewhat smaller, and after it, a somewhat greater, area under organized forestry than Finland. Whereas, in Sweden, the number of trained foresters has remained round the 1,000 mark during the past 30 years, the number in Finland has risen from 646 in 1930 to 1,550 in 1949. Unless the Finnish government takes energetic steps to extend and intensify forestry practice—and desirable as this is, the State's resources are limited and current pay scales inadequate—some unemployment is inevitable.

92. FOREST LAW

See also *For. Abstr.* 11 (Nos. 2498, 3258, 3421–2, 3447–8).

3442. ACATAY, G., and ERDEM, R. Yeni ek orman kanunlarinin orman korumada sağliyacaği kolayliklar münasebetiyle. **[New forest decrees for measures of forest protection.]** *Ankard Yüksek Ziraat Enstitüsü Dergisi* 5 (1) (Ser. No. 9), 1945 (300–11). 8 refs. [Turk.]

The Forest Law of 1937, which empowered the State to take over control of all forests, and the Law of 1945, No. 4785, which finally nationalized all forests, are discussed and, in particular, the advantages thereby gained for

the proper control of forest pests, especially from the air.

3443. **The House of Commons of Canada; Bill 62. An Act respecting Forest Conservation.** Canad. Pulp Paper Ass. Woodlands Section. 1949. pp. 3.

This Bill (of which the text is given) had its 3rd reading in the Federal House of Commons on Nov. 30, 1949. It repeals the Dominion Forest Reserves and Parks Act, and provides new legislation more in line with present needs. It provides for the establishment and maintenance of National Forests and Forest Experimental Areas and forest products laboratories, and gives the Minister the authority to assist any province or private owner in the protection, development or utilization of forest resources. A second Act, Bill 211, establishes a new Department of Resources and Development as part of a re-organization of the old Department of Mines and Resources, and enables greater attention and effort to be devoted to forestry matters.

3444. **An Act relating to Forest Conservation and Taxation Ch. 295, Laws of 1949 [New Hampshire].** New Hampshire Forestry and Recreation Department. [1949]. pp. 18.

The text of the Act, and exposition of how it will work.

3445. Fueron reglamentadas las funciones de la administración nacional de bosques. **[The functions of the national forest administration have been established].** *Maderil, B. Aires* 21–22 (252–4), 1949 (12, 24–6; 23–6; 24–6). [Span.]

The text of the decree of June 1949 in which the constitution and functions of the new national forest department were formulated.

94. FOREST OWNERSHIP. CO-OPERATIVES

See also *For. Abstr.* 11 (Nos. 3421, 3450).

3446. Barthos, G. Vázlatok az állami kezelésbe vett erdök Köréböl. **[Notes on [Hungarian] forests under State management.]** *Erdész. Lap.* 85 (4), 1949 (83–7). [Hu.f.e.g.]

Compares, to their disadvantage, the small and scattered communal, corporation and private forests, especially those without working plans, citing data from a south-Danube district.

3447. Holand, P. Husbruksskoger. Kommuneskogene. **[Jointly owned forests for supplying the domestic needs of farms. Community forests.]** *Tidsskr. Skogbr.* 56 (9; 10), 1948 (211–7; 259–62). [Nor.]

A lecture on the history of and legal provisions regarding these types of forest in Norway, with suggestions for remedying what, in the author's opinion, are inadequacies in the existing legislation on and administration of these forests.

3448. Anderson, M. L. **State control of private forestry under European democracies. A survey of developments in 8 countries of Western Europe in the decade 1938–1948.** *Oxf. For. Mem.* No. 22, 1950. pp. 112. 67 refs. [Price 17*s.* 6*d.*]

Includes the following chapters:—Historical survey of the relationship of the state to private forestry. Developments in Belgium, Denmark, Finland, France, the Netherlands, Norway, Sweden, and Switzerland respectively. Significant recent developments.

95. FOREST TAXATION, LOANS AND INSURANCE

3449. Hart, C. E. **Taxation of woodlands in England and Wales (up to and including the Finance Act, 1949).** Published by the author at Woodgate, nr. Coleford, Glos. New ed., 1949. pp. 13.

3450. **Forestry lots in the New Territories [, Hong Kong].** *Rep. For. Off. Hong Kong* 1949 (6–7).

In the past, village communities in the New Territories, holding forest lots under licence for the purpose of growing Pine trees, have only derived a minimum yield therefrom, owing to the economic necessity for felling the trees prematurely in order to obtain an early monetary return. A scheme has now been introduced, under which the villagers, on consenting to place the management of their lots under the Forestry Department may receive financial aid in restocking them. The immediate effect is that the villagers are not permitted to cut the Pine trees growing on their lots, without the consent of the Forestry

Officer, but are paid a wage to cover the cost of all planting operations done under the direction of the Forestry Department. Since, on most of the lots, there are areas of poor scrub vegetation which have to be cleared before the Pine can be planted, and which can be sold on the market as firewood, there is still some yield to replace the normal yield from the Pine trees on the lot. In order to avoid undue hardship and to assist in building up capital value of the trees, approval has been given for granting small loans to the holders of forestry lots participating in this scheme, against the market value of the Pine trees growing on them.

3451. WILLIAMS, E. T. **Forest insurance.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 26, 1949. pp. 85. 86 refs.

Summarizes the progress made to date both in the U.S.A. and elsewhere, and discusses the difficulties inherent in this important, but as yet relatively undeveloped branch of forest economy. The author writes primarily from the insurance point of view.

96. POLICY REGARDING PROTECTION FOREST, DEFORESTATION AND AFFORESTATION

See also *For. Abstr.* 11
(Nos. 2613, 2683–5, 3431, 3439, 3456).

3452. FORSHELL, W. P. Den norrländska skogen: handlingsprogram för återuppbyggnad. **[The forests of Norrland: a programme of action for rehabilitation.]** *Norrlands SkogsvFörb. Tidskr.* 1948 (4), (417–34). [Sw.]

[Cf. *For. Abstr.* 7 (No. 1722); 8 (No. 214).]

The present paper (a lecture) reviews the regeneration problem for Norrland and Kopparberg, quoting the Swedish Forest Research Institute's estimates of the minimum measures required annually for the next 20-year period as:—clearing up of felling sites, 60,000 ha.; soil scarification, 6,500 ha.; burning, 17,000 ha.; and artificial regeneration (chiefly direct sowing), 40,000 ha. Besides this, much else is in need of tending.

The author outlines the programme of action that he considers necessary to meet this situation.

3453. ACOSTA SOLÍS, M. Plan sobre la protección y fomento forestal del Ecuador. **[Plan for forest protection and development in Ecuador.]** Corporación Ecuatoriana de Fomento, Quito. 1949. pp. 45 + 3 dgms. [Span.]

Outlines a project for the formation and organization of an Institute for Forest Conservation and Development, and plans for a 5-year reforestation programme and the organization of new arboreta and forest nurseries.

97. POLICY REGARDING THE RELATION OF THE FOREST TO AGRICULTURE, PASTURE, AND INDUSTRY

See also *For. Abstr.* 11
(Nos. 2472, 2501, 3257, 3390).

3454. EGGELING, W. J. **Land utilization with special reference to forestry.** *Bull. agric. Congo belge* 40 (3/4), 1949 (2379–84). [E.]

Mainly a review of papers read at the Fifth British Empire Forestry Conference, on land use. [Cf. *For. Abstr.* 9 (No. 1396).]

3455. **The allocation of land for rural use together with a consideration of forestry problems in relation to peasant economy.** *Bull. agric. Congo belge* 40 (3/4), 1949 (2385–92). [E.]

A paper contributed by the Nigerian Forestry Department, with special reference to Nigerian conditions.

3456. GOMEZ, P. L'organisation forestière du haut et du moyen Ituri dans le cadre du double problème de la reforestation et de la conservation des sols de ces régions d'altitude. **[Forest organization of the High and Middle Ituri [Belgian Congo] in relation to the double problem of afforestation and soil conservation at high altitudes.]** *Bull. agric. Congo belge* 40 (3/4), 1949 (2392–432). 40 refs.

Cf. *For. Abstr.* 10 (No. 2376).

3457. BOIS, H. DU, and LECOMTE, M. Note sur la conservation des sols et la régénération forestière à la station et dans le paysannat de Bambesa. **[Note on soil conservation and forest regeneration at the experimental station and on native cultivation areas at Bambesa [Belgian Congo].]** *Bull. agric. Congo belge* 40 (3/4), 1949 (2456–67).

Mainly a discussion of optimum rotation for native systems of shifting cultivation.

3458. Ross, J. C. **Land use and soil conservation in the Union of South Africa.** *Bull. agric. Congo belge* 40 (3/4), 1949 (2123–40). 10 refs. [E.]

3459. Sjöström, H. Betesfrågan i Norrland. **[The grazing problem in Norrland.]** *Norrlands SkogsvFörb. Tidskr.* 1948 (4), (380–93). [Sw.]

Draws attention to the need for controlling sheep and goat grazing on forest land in Norrland. Except in two counties (Jämtland and Västernorrland), such grazing is already prohibited by law, but enforcement has not been strict. Goat grazing, the more injurious, has declined steadily since the 1920's, but sheep grazing has been increasing since about 1937 and considerable damage is done locally to regeneration. There is a need for both research on grazing damage, and regulation and practical control measures to supplement the laws, which are incapable of giving a complete solution to the problem. On the practical side, the author urges the creation of special associations for regulated collective sheep grazing on natural forest and other pastures, preferably at the higher altitudes and where natural barriers reduce the extent of fencing necessary. Limited experience of collective sheep grazing has already been gained in two Crown Parks. What is now needed is an inventory and investigation of available lands in the region, and the provision of public subsidies towards rent, fencing and clearing where necessary. It is probable that, if it were well organized and controlled, sheep grazing might be considerably expanded without detriment to forestry in Norrland.

3460. Córdova, J. P., Wadsworth, F. H., and Vivaldi, S. A. **What kind of land is adapted to trees?** *Carib. For.* 10 (4), 1949 (239–44, 277–82). [E.Span.]

Presents: (1) a classification of land in Puerto Rico by the Soil Conservation Service according to 8 capability classes, with recommendations for their use, and (2) comments by the Forest Service and the Agricultural Extension Service. The Forest Service points out that the more heavily populated rural districts are far from the national forests and require a local source of supply of forest products, and that, therefore, small woodlots should be established throughout the country.

FORESTRY THE WORLD OVER

References: 1. *Administration Report of the Conservator of Forests*, Ceylon. 2. *American Forests*, Washington. 3. *British Columbia Lumberman*, Vancouver. 4. *Canadian Pulp and Paper Association News Bulletin*, Montreal. 5. *Erdészeti Lapok*, Budapest. 6. *Foreign Commerce Weekly*, Washington. 7. *Forestry Chronicle*, Toronto. 8. *IAI Bulletin*, Prague. 9. *India News*, London. 10. *Industria del Legno*, Milan. 11. *Italia agricola*, Rome. 12. *Lesnická Práce*, Pisek. 13. *Lesnaya Promÿshlennost'*, Moscow. 14. *Naval Stores Review*, New Orleans. 15. *Quarterly Journal of Forestry*, London. 16. *Revue internationale du Bois*, Paris. 17. *Scottish Forestry Journal*, Edinburgh. 18. *Timber and Plywood*, London. 19. *Timber of Canada*, Ottawa. 20. *Times*, London. 21. *Unasylva*, Washington. 22. *Wood*, London. 23. *Wood Products*, Chicago. 24. *Woodland World*, Montreal.

Conferences. The following conferences have been arranged:—

1950	
3-5 May	Conference on Atmospheric Pollution, Washington.
8 May	9th International Congress of Seed-testing Association, Washington.
27-30 June	General meeting of Verein der Zellstoff- u. Papier-Chemiker- u. Ingenieure, Constance.
June-July	Review Conference, Commonwealth Agricultural Bureaux, U.K.
July	4th International Congress of Soil Science, Holland.
4-8 Sept.	International Congress of Cell Biology, Yale.
Sept.	World Wood-Chemistry Congress, Stockholm.

Brazil. Laminated propellers are being made from Brazilian Ivory wood (*Balfourodendron riedelianum*). Many small Brazilian aircraft are now equipped with these, and they are proving superior to propellers made of Walnut, Mahogany or Freijo (*Cordia goeldiana*). *B. riedelianum* wood is also successfully used as a substitute for *Diospyros virginiana* in the manufacture of shuttles. Its density is 0·87 (**19**; Nov. 1949).

Bulgaria. The Bulgarian Government is planning to plant 2,000 miles of windbreaks in the Dobrudja steppe. The main belts will be of 5-7 rows, 35 ft. deep, impermeable to wind, and planted at 55-yd. intervals; the cross windbreaks will be 24 ft. deep and of open structure. The species to be used are *Acer platanoides*, *Quercus rubra*, *Q. americana*, *Tilia* spp., *Morus* sp., *Fraxinus americana*, *Acer pseudoplatanus*, *Ulmus campestris* etc. Work was started in 1949. The Sofia Forest Research Bulletin has opened a special department for the study of windbreaks, which is shortly to be made into an independent institute (**8**; Jan. 1950).

Canada. In mature stands of White Spruce, Aspen and Jack Pine in the Candle Lake Provincial Forest, Saskatchewan, are patches in which the entire stand is either dead or seriously stag-headed. It is believed that the damage was caused by unusually heavy hail storms in 1943. Large, partly healed wounds occur on one side of the upper parts of the trees, where the bark appears to have been pounded off by the bombardment of hailstones (**7**; Mar. 1950).

A new society, the Canadian Institute of Forest Products, is shortly to be set up. Its purpose is two-fold:—(1) to promote more efficient utilization of wood and other forest products, and (2) to help in the interchange of information between individuals and organizations. Four classes of membership are envisaged:—active, corporate, associate, and student. It is proposed to hold the first general meeting in Ottawa in the autumn of this year under the presidency of Professor J. W. B. Sisam, Dean of the Faculty of Forestry at Toronto University. Enquiries should be addressed to W. Forbes LeClair, Secretary, Canadian Institute of Forest Products, 27 Goulbourn Avenue, Ottawa (**19**; April 1950).

A total of 850 cords of pulpwood was salvaged from the bottom of the Rocky River, Shelter Bay, Quebec, by the Quebec North Shore Paper Co., during last summer. The volume of wood lost

there annually has been estimated at 2½% of the pulpwood drive. This is the first time that an organized attempt has been made to reclaim this loss. The wood recovered is already barked by its long period of immersion. 'Sounding' and 'mining' were the two methods used to recover the wood. In the sounding method, men working from rafts probed the river bed with pikes to locate the wood. 'Mining' was done when the river was at its lowest level; bulldozers travelled along the mud banks, which are normally under water, turned up the silt, and loosened the buried pulpwood bolts (**24**; Jan. 1950).

Ceylon. Instead of resorting entirely to poison frill girdling for freeing valuable species in dry mixed evergreen forest, a start was made in one or two divisions to fell the inferior species and convert them into split firewood for sale. The object of this was not only to make the maximum use of the material, but also to bring down the cost of firewood to the domestic consumer in towns. The most immediate success was experienced in the forests near Trincomalee, where, by the end of the year, the price of firewood was reduced from Rs. 42 to Rs. 28 per ton, while revenue collection through this channel amounted to Rs. 35-40 a day, or nearly Rs. 12,000 a year. Another agreeable feature of the scheme was that the illicit fellers themselves appeared to place greater reliance on the Forest Department than on their former 'black market' employers as paymasters, and most, if not all, of them 'enrolled themselves' as Forest Department labour. The direct consequence of this was a very marked decline in the number of forest offences in that locality (**1**; 1948).

China. The great Hsingan Forest of the Inner Mongolia Autonomous Area of China covers some 90,000 sq. km., according to the Chinese Communist press. It contains an estimated 753,000,000 cu.m. of softwood, mostly Larch and Fir, and 901,000,000 cu.m. of hardwoods, including Birch and Oak. In 1948, 89,584 cu.m. of lumber and 60,000 cu.m. of firewood were produced in Inner Mongolia (**6**; 20.2.50).

Czechoslovakia. A patent application (*Čs. patent přihl.č.P.* 1426/47) by K. Pavlíček covers a novel bark-beetle trap, the *Ipsolapka*, which is based on the observations that (*a*) bark-beetles prefer logs lying on the ground to standing trees; (*b*) during the swarming period beetles arriving on already heavily infested logs, do not remain, but seek other more lightly populated material; (*c*) if a flying beetle hits a pane of glass, it drops straight to the ground. The *Ipsolapka* consists of a glass pane 2 mm. thick, 90 cm. wide and 50 cm. high, held upright between ⊥-shaped wooden supports. Immediately underneath the pane there is a metal tray filled with water, in which the fallen beetles drown. This apparatus is used in conjunction with trap logs 25-35 cm. in diameter and 6 m. long, stacked in two layers, in small clearings near extraction roads, preferably upwind from the focus of infestation. Several *Ipsolapkas* are used per stack. During the swarming period some beetles are trapped straight away; others reach the logs and build up the usual population density; and yet others, arriving later, take flight and are trapped in numbers by the *Ipsolapkas*. The broods in the trap logs are dealt with in due course in the usual way. In tests, a board coated with bird-lime was tried as a substitute for the tray of water, but proved less effective (**12**; Jan. 1949).

All branches of the national economy are adopting the system of wages based on merit. The National Work Catalogue for Forestry has been approved. Tree felling, wood cutting and sawing have been classified as specialized labour. The most difficult types of wood-cutting work have been put into the 6th class, in which such skilled workers as welders, cabinet makers, or boiler-room engineers appear. Simpler types of wood-cutting have been placed in the 5th and 4th classes. Afforestation work has been put in the 3rd class and nursery work in the 2nd. Sleigh and boom operators are in the 6th class, cone pickers in the 5th etc. All types of work must be put on a piece-rate basis, following scientifically determined standards which are now being worked out (**8**; Jan. 1950).

An Agricultural and Forestry Documentation Centre has recently been opened at Košice in Eastern Slovakia. It will publish a monthly bulletin under the title 'Review of Agricultural and Forestry Literature' (**8**; Mar. 1950).

Europe. The Council of O.E.C.E. has approved the dispatch of a number of forestry experts to the U.S.A. to study the cultivation and utilization of the American Poplars from which the European

hybrid Poplars are derived. The mission will set out at the end of April in order to arrive in the U.S.A. in time for the flowering season (**16**; Feb. 1950).

Germany. Timber felling in the Eastern Zone during 1950 will be restricted to 92% of the 1949 cut, and it is intended to plant 80,000 ha. Quick growing Poplars are being used in the main, and many nurseries for their propagation have already been established (**8**; Mar. 1950).

Great Britain. The Forestry Commission announce that grants are to be offered to encourage the planting of Poplars for timber production, either in compact blocks or in lines or avenues. The grant for planting in blocks is £8 an acre, and for planting in lines or avenues, 2*s*. a tree. Half is to be paid at once and the other half, normally, after 5 years. Not more than 2 rows may be planted on each side of a stream, road, or hedge, or in other suitable locations. Amongst the uses of Poplar wood are match stock and chip baskets for packing fruit etc. (**20**; 8.6.50).

The Importation of Forest Trees (Prohibition) Order of 1949, which came into force in Oct. 1949, differs in certain important particulars from that previously in force. It is still considered advisable to forbid the import of living plants or parts of plants of the principal coniferous genera, namely *Abies*, *Larix*, *Picea*, *Pinus*, *Pseudotsuga*, *Sequoia*, *Thuja* and *Tsuga*, because of the risk of introducing diseases and pests from which this country is as yet free. The genus *Castanea* has been added to this list in view of the danger of introducing American Chestnut blight from Italy and Spain, where it is now known to occur. The genus *Ulmus*, which was previously prohibited, has now been deleted from the list. This is to allow the importation of disease-resistant Elms from abroad. Finally, the genus *Populus* has been included in the order, but on a different basis from the other genera. It will still be possible to import Poplars, provided that a licence is first obtained. Licences for very small quantities will normally be granted for any variety from any source, unless the variety is known to be very susceptible to disease, or the source known to be subject to a disease or pest not yet in this country. But for large imports, licences will be restricted to varieties known to be disease-resistant, and to countries where stocks, certified true to name by a recognized Government agency, are available. At the moment, Government certification is available only in Holland, but it is probable that other countries will follow suit. Applications for licences should be made in the first place to the Import Licensing Department, Board of Trade, Romney House, Tufton Street, London, S.W.1 (**17**; Jan. 1950).

J. R. Gordon & Co., Chester, have established a sawmill at Queens Ferry for the conversion of thinnings. The plant will consist of a heavy gang saw of the usual pattern for the production of colliery chocks from the largest sizes of timber handled by the mill, and 2 lighter gang saw sspecially designed to handle the smaller sizes. Power consumption is low, the smallest gang saw being driven by 30-h.p. and the others by 50-h.p. motors. It is expected that about 10,000 cu. ft. of round wood will be handled every week and that the thinnings will range in diameter from 2½ to 6 in., with an average of about 4 in. Among possible markets are local industry, the pits and horticulture (**18**; 23.3.50).

The Venesta company has begun production of a new type of plywood, 'Permaply', which, owing to special treatment of the veneer before gluing, has exceptional resistance to climatic extremes. Sheets of Permaply experimentally buried in the ground in the tropics were recovered in perfect condition after 3 years. Other sheets were immersed in salt water and in fresh water respectively for a year without suffering damage. The impregnating substance used notably reduces the moisture-absorbing capacity of the wood. Permaply is manufactured with various face veneers suitable for different uses (**10**; Mar. 1950).

Messrs. Beecroft & Wightman, of Hull, have a plant, said to be the only one of its kind in the world, turning out wood flour at the rate of 10 cwt. an hour, entirely from sawmill refuse. A feature of the 3-storey buildings is the care that has been taken to minimize the danger from fire. The wood chippings are sucked away from the planers and moulders in the sawmill, drop on to conveyor belts, and arrive in the mush store. From there they are fed to another conveyor and carried into the mill for the first stage of production; they are broken down in hammer mills, passed through reels for size grading and finally sent for dressing and a last grading. In the final grinding, the machine is driven by a 200-h.p. motor geared to a periphery speed of *ca*. 700 m.p.h., and holds only ⅛ oz. of the

material at a time. In the final stage the flour is fed into 1-cwt. sacks from automatic packers. Dust from the process is eliminated by dust extractors; the factory is thus kept clean and many sacks of fine flour are obtained (**15**; April 1950).

Glued laminated arches of Douglas Fir will be a feature of the 1951 Festival of Britain Exhibition, where they will form part of a special entrance at the approach from Waterloo Station. The timber industry of British Columbia is making a gift of 14 standards of Douglas Fir for the construction of these arches (**22**; Feb. 1950).

Greece. During the past 2 years, 45,000,000 seedling trees have been raised and planted from 75 state-operated nurseries at a cost of 9½ million drachmas. The Forest Service has also executed many anti-erosion works, constructed 20 miles of new access roads into forest areas, and improved 14 miles of existing roads (**6**; 22.5.50).

Hungary. In furtherance of the Five-year Plan, all forest stands in Hungary suitable for supplying seed have been registered and classified by site quality and location. All stages from collection to sowing have been rationalized and are centrally directed (**5**; Sept. 1949).

Forestry training schools, hitherto barred to women, have now been opened to them on the same terms as men. The Debreczen National Forest Enterprise has recently organized special courses for the training of women for forest work (**8**; Mar. 1950).

India. Nearly 17,000 men of the State Defence Corps, the civil defence force replacing the Home Guards, are engaged in clearing *ca.* 8,000 acres of scrub jungle near Lucknow. The area is full of short, deep-rooted trees and scrub, and the uprooting and clearing of each tree is a major operation. A fleet of tractors has started ploughing on the reclaimed ground, which is to be sown with rice. The men are working voluntarily without pay, but are fed and housed in a camp while working (**9**; 4.3.50).

International. There has hitherto existed no international association which could embrace all forestry and timber specialists in its membership. M. Bernard Dufay, formerly head of the French Forest Administration, has now taken the initiative in founding an International Forestry and Timber Association (Association Internationale de la Forêt et du Bois). The central office is at 97 Rue St. Lazare, Paris, and full information about the association may be obtained from this address (**21**; Jan.-Mar. 1950).

Israel. The Government of Israel has allocated £500,000 for its recently announced afforestation programme. A large nursery has been established and it was expected that 2,400,000 forest trees would be planted during the first 4 months of this year. Forestry experts from Switzerland and Italy have arrived to help the Government in its programme (**6**; 27.2.50).

Italy. For many years a well known Italian maker of bicycles has toyed with the idea of building a machine of laminated wood, and when steel supplies became short during the war, he began serious work on the idea and produced a design that proved thoroughly practicable. The main frame consists of a continuous length of laminated Ash and Beech, shaped and bent to form the forked seat stays, crossbar, head, and down 'tube', at the bottom of which it broadens to allow the bolting of the bottom bracket, dividing into a fork again for the chain stays. The seat 'tube', which is of laminated Beech double-butted, and the seat pillar are the only round parts of the frame. The ends of the laminated forks, back and front, are pegged into alloy castings. The head assembly, which is of nickel chrome steel, passes through the top and down tubes, giving extra rigidity to the frame. Handlebars also are laminated, and the mudguards are of Beech. Wood-frame wheels are, of course, a standard fitting for light-weight machines. The Vianzone laminated wood bicycle is finding a widening circle of riders, who say that it reduces fatigue to a minimum because of its light weight (12½ lb. fully equipped) and general resilience. The machine has undergone exhaustive road tests in Italy, which the present state of the roads in that country renders very severe. The maker describes the Vianzone as 'bicicletta robusta, elegante, elastica, silenziosa' (**22**; Oct. 1949).

Rumania. Rumanian factories will soon begin the mass production of an automatic machine for Oak planting. This machine, designed by the director of the forestry department in the Tutov district, does the work of 150 people and considerably reduces the cost of afforestation (**8**; Jan. 1950).

In the arid regions of south-western Rumania, the planting of windbreaks has been started on a large scale to protect farm land from wind erosion, and roads and railways from snowdrifts. A 4-year plan has been laid down, which envisages the formation, within the Ministry of Agriculture, of a central office charged with the execution of the plan and the training of experts (**12**; Sept. 1949).

Switzerland. New models of the Wyssen skyline-crane with 10,000 lb. and 20,000 lb. capacity respectively are now being designed by the Wyssen Co., Reichenbach (**3**; Feb. 1950).

U.S.A. President Truman's executive order creating an 'airspace reservation' over the million-acre roadless area of the Superior National Forest in Minnesota, closes this area to private and commercial planes, thus eliminating the heavy air traffic now flowing to lakes and waterways primarily reserved for wilderness canoe travel. General flying will be banned after 1 January 1951; resorts that have been built up on private lands within the area cannot be served by air after 1 January 1952; and after that date all planes flying over the area for distant destinations must keep above 4,000 ft. This unprecedented action has been bitterly fought by aviation and other interests, but it can be taken for granted that the President, as well as the Secretary of Agriculture, who initiated the order, and the Secretary for the Interior, who supported it, are prepared to defend it at need (**2**; Feb. 1950).

The flowers of *Oxydendrum arboreum* are extraordinarily attractive to bees, both before and after they fall. A hive placed near one of these trees in 1948 produced 25 kg. of honey compared with the local average of 5-6 kg. The honey never granulates and is of a fine colour and delicious flavour (**11**; Oct. 1949).

The Oregon Wood Chemical Company, Springfield, Ore., is shortly to start a new industry for the production of wax from Douglas-Fir waste bark. The wax is extracted by pumping benzine through a tank charged with ground bark. The solvent and the wax so extracted, are then pumped into a second tank, where the benzine is separated from the dissolved wax by steam distillation. The process was discovered by Dr. E. F. Kurth, chemist of the Oregon Forest Products Co. at Corvallis. The product is comparable with beeswax. There are believed to be 1½ million tons of Douglas-Fir bark available annually in the Pacific Northwest, which is sufficient to produce 150 million lb. of wax, and from that same bark about 150,000 tons of tannin can be extracted (**23**; April 1950).

Maleo-pimaric acid, a new product developed by the Naval Stores Research Division, Southern Regional Research Laboratory, Bureau of Agriculture and Industry, New Orleans, is the adduct of maleic anhydride with the laevo-pimaric acid of Pine resin. It has possible uses in the production of plasticizers, resins and emulsifying agents, and has now reached a stage of development where commercial testing is possible (**14**; Feb. 1950).

Chemists of the Southern Research Institute, Birmingham, Ala., have found a way to convert railway poles and sleepers into a paper called 'Old Crosstie Kraft'. It is estimated that the equivalent of 2,000,000 cords has been wasted annually in the past, and that this discarded wood could be used for wallboard as well as for paper (**4**; Feb. 1950).

U.S.S.R. It is planned to plant *Sequoia gigantea* on a large scale on the southern shores of the peninsula between the Sea of Azov and the Black Sea, where it grows well at elevations up to 400 m. *Sequoia* in the Crimea begins to bear seed at 35-40 years of age, but bears most abundantly at 70-80. The number of cones per tree is high and average number of seeds per cone is 150, but viability is low (only 5-15%). Another exotic that has been successfully acclimatized is *Thuja plicata*, which was introduced into the Ukraine in 1870. The largest specimens are 22 m. high and 36 cm. in diameter at 70 years of age. It has withstood the exceptionally cold winters of recent years and produces good seed. It is intended to use it for afforestation in western Transcaucasia, Ciscaucasia, the foothills of the Carpathians and southern and south-western White Russia (**21**; Jan.-Mar. 1950).

In some parts of northern Russia, *Juniperus communis* reaches a height of 10·75 m. and a diameter of 19 cm. at the base. Sometimes it forms pure stands. One such stand contained some 1,032 trees/ha. ranging from 3 to 15 cm. d.b.h. Average age was 63 years, average height 5·9 m., diameter

5·7 cm. and volume 9·3 cu.m. The only use made of the wood is locally for fence posts and wooden crosses in cemeteries, but its fine grain, attractive colour and good working qualities would fit it for many uses (**2**; Jan.-Mar. 1950).

Aerial forest surveys are the only practical method of obtaining data on the extent, location, and character of the vast unexplored forests of the U.S.S.R. Some 410 million ha. of forests have so far been covered by aerial surveys. More than half of this area lies in the Far East, in the basins of the rivers Yenisei and Lena. In European Russia, the forests in the basins of the Mezen and the Pechora have been entirely covered by aerial surveys (**3**; April 1950).

Experiments have been in progress in Uzbekistan, on the possibility of large-scale planting of Eucalypts for timber production and essential oils, and also for the drainage of land having an excessively high water table. Results have been successful, and during the next 3 years it is intended to raise 200,000 Eucalypts for planting in Uzbekistan (**21**; April-June 1950).

Investigations in Russian forests have shown that the degree of inflammability of a forest depends on three factors:—(1) temperature in degrees Centigrade during the preceding 13 hours; (2) moisture deficiency in millibars during the same period; (3) the number of days elapsed since the last rain. The amount of precipitation apparently has little effect on the inflammability of vegetation on the ground, where most fires start (**21**; Jan.-Mar. 1950).

A resin research laboratory is being set up in the Central Forest Chemical Research Institute (TsNILKhI). It will have experimental sub-stations in the southern, northern, central, Urals, and Siberian zones. The central zone sub-station will study all problems in resin-tapping, and will have at its disposal a block of 500 ha. of mature and almost mature Pine stands (**13**; Sept. 1949).